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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Chemical Society's Meeting

THE annual meeting of the Chemical Society in Manchester last week—the first annual meeting, we understand, to be held outside London—was, from all the accounts we have heard, a pleasant and successful gathering. The experiment of meeting in the provinces was a grave departure from tradition in the case of so properly conservative a body, but no ill effects appear to have been suffered. The plan of meeting once a year at different centres is, in fact, to be commended in the cases of all such national bodies, for the practice of always remaining in London tends to create suspicion among provincial members that the organisation is run by a few people at headquarters. That is bad from both sides. The Londoner is the better for occasional first-hand acquaintance with local opinions and conditions; without such contact he is apt, in fact, while believing himself to be always at the very centre of things, to develop a particularly provincial spirit and to miss a proper appreciation of the work of our great educational, scientific, industrial and commercial communities in different parts of the country. It is equally good for the districts to be occasional hosts of national assemblies; they learn and they teach in the process, and every one concerned is the better for the wider experience.

The retiring president, Dr. Crossley, spoke out of a full stock of knowledge and experience on the subject of industrial research, and the members, while in Manchester, would have ample opportunity of seeing what a wide field there is in industry for the fuller applications of science. His successor, Professor Baker, himself a Lancashire man, was appropriately elected to the chair in his own county, and will, we have no doubt, worthily uphold the high traditions of the presidential office. An interesting feature of the meeting was the visit paid to the research laboratories and works of the British Dyestuffs Corporation. The visitors appear to have been impressed by the progress that is visibly taking place under the new management, by the excellence of the research service, and by the steady overcoming of the difficulties the Corporation has had to face.

Coal Moisture and Spontaneous Heating

IN view of the anxious outlook in the coal industry, fuel consumers of all degrees have for the past few weeks been busily engaged in preparing themselves for any possible contingency; stocks have been materially added to and business in all types of solid fuels has been comparatively brisk, but with no very marked effect on prices. It is at times such as the present, when accumulations of coal at the consumer's works become swollen to, perhaps, twice their normal figure, that the nuisance of spontaneous combustion is most likely to make itself felt, and it will not, accordingly, be out of place to draw attention to the important conclusions that were recently arrived at by two workers of the Pittsburgh station of the United States Bureau of Mines in connection with the influence of moisture on the spontaneous heating of coal.

The phenomenon of spontaneous ignition has for years been a favourite subject for discussion, and although when certain well-defined precautions are taken, the chances of trouble are minimised, there is no universal panacea, the result being that fires usually occur when least they are expected. Various authorities have attributed the rise in temperature to occluded oxygen, to the presence of sulphur compounds, and to various other causes, but the presence of moisture as a promoting factor has always led to a great deal of argument. By some it has been considered as definitely necessary before spontaneous combustion can occur; others contend that it merely facilitates or hastens the oxidation that would take place without it, while still others claim that even a small amount of moisture will actually prevent a rise in temperature. The point is, however, one of extreme importance, for in some cases it is the practice—and in this country it has usually been regarded as a somewhat dangerous one—to wet down the coal at the time of storing.

It has always been difficult from the results of practical experience to determine definitely whether or not such a practice is aggravating the trouble which it is intended to check, and for this reason the carefully planned work of the Bureau of Mines is well worth consideration. The one question of vital importance to those storing coal is whether or not the heat resulting from increased absorption of oxygen (if any) by a moist coal is outbalanced by the cooling due to vaporisation which must take place as the temperature of the heap rises. Determination of the individual influence of moisture in a large coal heap raises so complicated a problem that it practically defies solution, but the American small-scale tests were carried out with sufficient regard to practical effect to make them more or less acceptable from the standpoint of bulk storage. In applying the results of these tests, however, to actual storage conditions, caution must be used, for storage conditions involve indeterminate factors which are eliminated in the laboratory.

In the light of the most general practice in this country, where wet coals are usually regarded with suspicion and where elaborate roofed-in stores are frequently provided in order to keep the coal dry, the American conclusions appear, perhaps, a little startling. The research indicates, in fact, that it is better to store the coal moist rather than dry, and it is suggested that such a conclusion is in harmony with theory, since pores in coal that are filled with moisture leave no space for the absorption of oxygen. Furthermore, if the coal is moist enough to be out of equilibrium with the atmosphere, moisture will slowly evaporate, and there will be cooling due to the latent heat of vaporisation. A very dry coal, on the other hand, will take up moisture from the atmosphere, and the heat of condensation will raise its temperature. The reasoning certainly is sound, but it is scarcely likely to assist in straightening out the confusion of opinion that already exists.

Purity in Ammonia Synthesis

A COMMUNICATION from two members of the staff of the United States Fixed Nitrogen Laboratory (who have been studying the available means for effecting the ultra-purification of gaseous mixtures) prompts one to recall the enormous strides that have been made in late years in the process of gas purification owing to the unusual purity of the reacting substances which is demanded for catalytic synthesis. As is well known, in catalytic reactions the close chemical control of the composition of both the catalytic material and the reacting gases is of the utmost importance in order to ensure the absence of compounds which inhibit or entirely preclude the progress of the desired reaction, a consideration which applies in particular in the case of ammonia synthesis.

It may be said that the necessity for ultra-purification was realised, and that its development dates from the time when it first began to be appreciated that the catalytic formation of ammonia is susceptible to derangement by the presence of certain impurities in concentrations so small as would ordinarily be regarded as insignificant. The degree to which purification must be carried depends, of course, upon the catalyst employed and upon the methods of operation, but probably carbon monoxide present in the hydrogen destined for ammonia synthesis is one of the most difficult of the common poisons to remove completely. Water gas is still the source of the hydrogen used for synthesis by the Badische undertaking, and in this case precautions have, of course, to be taken to deal with the residual CO likely to be present. It is interesting to note, however, from a comparatively recent statement in the German technical press, that Claude claims to have discovered a really cheap catalyst material which is far less susceptible to the inhibiting effect of carbon monoxide, and although the actual composition of the substance is not disclosed, it is said to operate in a perfectly satisfactory manner in connection with the hydrogen obtained from coke-oven gas (as at Béthune), which is generally understood to contain an appreciable quantity of carbon monoxide.

If the claim of Claude in respect of the utilisation of hydrogen containing an appreciable quantity of carbon monoxide is fully substantiated in practice, it should go a long way towards removing one of the obstacles arising in commercial ammonia synthesis. If it is accepted that the catalytic water gas process is the cheapest and most promising of the methods for large-scale hydrogen production in those countries where an abundance of natural water power is not available, then the question of ultra-purification from CO, with its attendant complications, would not seem to arise, or at least not in the same degree. It is interesting to note, while giving consideration to the CO question, that many and varied patents have been applied for in connection with its removal, but, according to the Fixed Nitrogen Laboratory's communication, only one of the absorption methods suggested, namely, the scrubbing of the compressed gas with an ammoniacal solution of cuprous carbonate or formate, is now being used in the treatment of gases in commercial ammonia synthesis.

The Gospel of Standardisation

IN some recent notes on the Coal Report attention was drawn to the need of more modern equipment and plant in connection with the collieries and better engineering and scientific practice generally. It is of interest to note the statement in the Report that the Mining Association, with the British Engineering Standards Association, has recently set out to standardise colliery plant and equipment and that the work is proceeding through committees of those concerned with the manufacture and use of such plant. "It is," the Commissioners remark, "perhaps the most important general inquiry in which the industry has in recent times been engaged, and in view of the multifarious types of plant and equipment now used at different collieries for similar purposes, it may be expected to yield valuable gains in efficiency and economy." What the Commissioners say of colliery equipment may, with greater or lesser truth, be said of nearly every large machinery-using industry in the country, and it is becoming clear that for the elimination of wasteful duplication and the lessening of production costs the almost endless eccentricity of individual design and practice must be replaced by collective action, of which standardisation is one important example.

This important matter, we note, was strongly emphasised by Colonel Vernon Willey in his closing address as President of the Federation of British Industries, and one may be sure that his successor, Sir Max Muspratt, will be no less eager to support the movement towards greater industrial efficiency. Valuable as the British quality of individualism is, it is in many directions carried to excess; the passion of each firm for having something different from its neighbour is largely the cause of the false secretiveness which so much hampers the pooling of ideas and experience in the common interests of all. No serious person, as Colonel Willey pointed out, wants a crushing uniformity of style or a lowering of the standard of quality or the exclusion of individual initiative and character; what is wanted is the elimination of wasteful and quite unnecessary duplication. It is steadily becoming clearer that for the maintenance of both profits and wages, as well as for the provision of cheap commodities for the public, large scale production and a much more liberal use of mechanical methods are essential. At last the stolid indifference of old-fashioned employers and the irrational hostility of labour organisations to scientific methods of increasing and cheapening output by the simplification of methods and the substitution of mechanical for hand labour are beginning to yield to more enlightened ideas. But, in this country, it is necessary to remember, we are still much nearer the beginning than the end of the movement.

British Association at Oxford

THE annual meeting of the British Association for 1926 is to be held at Oxford during the week August 4–11. This will be the Association's fifth visit to the city, the previous ones having been in 1832, 1847, 1860, and 1894. The meeting of 1847 was remarkable for Joule's exposition of his theories upon the mechanical equivalent of heat, that of 1860 for the controversy in which Huxley and Hooper were involved with Wilberforce on the Darwinian theory of evolution, and that of 1894 for Sir Oliver Lodge's first demonstration in public of wireless telegraphy. What the forthcoming meeting will be distinguished for, if at all, remains to be seen.

The president this year of the Chemistry Section is Professor Jocelyn Thorpe, who has selected as the subject of his presidential address, "The Scope of Organic Chemistry." The vice-presidents of the Section are Professor Desch and Dr. Sidgwick; the recorder, Dr. H. McCombie, of King's College, Cambridge; the secretary, Professor C. S. Gibson; and the local secretary, Dr. A. C. G. Egerton. The full details of the programme are not yet available, but we notice that there is to be a lecture on "Present-day Scientific Problems in Fuels" and a discussion on "Tautomerism." Even members of the British Association may be glad to learn from an obliging footnote in the programme that the latter term "is applied to the property exhibited by certain organic compounds of behaving in different reactions as if they possessed two or more different constitutions; that is, as if the atoms of the same compound or group were arranged in two or more different ways, expressible by different structural formulæ." There is also to be a joint discussion with the Mathematics and Physics Section on "The Mechanism of Homogeneous Chemical Reactions." It sounds useful, if not very exciting.

French Government and By-Products

DR. CHARLES CARPENTER, at a meeting of the European Gas Co. last week, drew attention to the rather remarkable action of the French Government in compelling the French gas undertakings to extract the benzol from the gas they produce and place it at the disposal of the State for munitions, dyes, and motor traction purposes. If France were in or were preparing for a state of war with other nations such a step might cause no surprise, but in time of peace the order is a little disturbing, not only to the gas concerns, which may suddenly be called on to install costly plant, but to people who have had quite enough of war for some time to come. French statesmen, like the popular French coin, appear to be suffering badly from nerves, and it would be a real service if someone could make them understand that nervous people are apt to become an inconvenience, if not a danger, to their neighbours. Dr. Carpenter's account of the outlook in the sulphate of ammonia market was not too rosy. In France, as elsewhere, the synthetic product is becoming a serious competitor with gasworks ammonia. For fertiliser purposes, synthetic sulphate is, for some reason, finding favour with agriculturists, and as production continues to increase the price tendency promises to be still downward. While the market for residual products generally remains weak, tar is becoming increasingly popular among French engineers and surveyors for road construction, and in this section at least there may be a possibility of better prices.

The Calendar

Apr.		
6	Hull Chemical and Engineering Society: Annual Meeting. 7.45 p.m.	Grey Street, Park Street, Hull
6	Institute of Metals (Birmingham Section): Annual General Meeting. 7 p.m.	Chamber of Commerce, New Street, Birmingham
7	Society of Public Analysts. 8 p.m.	Burlington House, Piccadilly, London
9	Institute of Metals (Sheffield Section): "Bronze." R. T. Rolfe. 7.30 p.m.	The University, St. George's Square, Sheffield
9	Society of Chemical Industry (Manchester Section): "The Constitution of Coal." R. V. Wheeler. 7 p.m.	16, St. Mary's Parsonage, Manchester
12	Royal Institution: General Meeting. 5 p.m.	21, Albemarle Street, London, W.1.
12–17	Optical Convention	Imperial College of Science and Technology, South Kensington, London
13	Institution of Petroleum Technologists	Aldine House, Bedford Street, London, W.C.2
14	Chemical Engineering Group. Joint meeting with the Institution of Chemical Engineers: "The Beet Sugar Industry." J. Kwantes. 8 p.m.	Burlington House, London
15	Chemical Society: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London
15	Optical Society: Ordinary Meeting. 7.30 p.m.	Imperial College of Science and Technology, South Kensington, London
16	Society of Dyers and Colourists (Manchester Section): "A New Reaction of certain Diazo-sulphonates derived from *b*-naphthol-*l*-sulphonic acid." F. M. Rowe, E. Levin, A. C. Burns, J. S. H. Davies and W. Tepper	Manchester

Catalysts and Enzymes: Industrial Applications.—(I)

By J. B. Firth, D.Sc., F.I.C.

Below we give the first instalment of the Jesse Boot Foundation lecture delivered at the University College, Nottingham, on Friday, March 26, by Dr. J. B. Firth. The conclusion will appear next week.

It has been known for a long time that the speed of reactions may be accelerated or retarded by the presence of a foreign substance whose composition at the end of a reaction is the same as at the beginning. The foreign substance is called a catalyst or catalytic agent and the phenomenon is termed catalysis. At one time catalytic actions were regarded as comparatively rare, but we now know of an enormous number of reactions susceptible to catalytic influence. Ostwald expresses the opinion that there is probably no reaction which cannot be influenced catalytically and no substance which cannot act as a catalyst.

Catalysis and Catalysts

It is difficult to define catalysis precisely, but it is best regarded as a term applied to those reactions whose speed is modified by the presence of a small amount of substance, which itself possesses finally the same chemical composition as it had at the beginning. Some are of the opinion that a catalyst can only accelerate or retard a reaction, but cannot actually start a reaction, whilst others agree that a catalyst can not only accelerate but also induce a reaction between two substances. A characteristic feature of a catalyst is that extremely minute quantities of it are capable of transforming considerable quantities of reactants. Thus, one part of colloidal platinum is capable of bringing about the union of 25,000,000 parts of a mixture of hydrogen and oxygen.

The enormous influence of water vapour in many chemical changes affords numerous striking instances of catalysis. Perfectly dry carbon monoxide and oxygen will not unite under the influence of an electric spark. Many elements which normally combine readily with oxygen or chlorine fail to do so when the materials are perfectly dry; thus sodium may be heated in dry oxygen without any chemical change occurring. Dry ammonia will not unite with dry hydrochloric acid and so on. Armstrong expresses the opinion that two perfectly *pure* substances cannot react, the presence of a third being essential to start the chemical change.

It is not within the scope of the present lecture to deal with the theories of catalysis, but the most important may be mentioned: (*a*) Intermediate compound theories; (*b*) Adsorption and radiation theories.

Catalytic Poisons and Promoters

The activity of a catalyst may vary over a wide range; for example it is considerably influenced by its physical condition. Many catalysts are exceedingly sensitive and their activity may be considerably impaired or killed altogether by certain substances, in which case the catalyst is said to be poisoned. Thus colloidal platinum loses its activity in presence of such substances as arsine, phosphine, hydrocyanic acid, hydrogen sulphide, etc. Again, by partial and controlled poisoning of the catalyst specific and different products may be obtained from one starting material. Alcohol may be made to give aldehyde, ether, or ethylene, according to the degree of poisoning of the catalyst by foreign substances.

On the other hand a number of substances have the power of rendering the catalyst more active. These substances are known as "promoters" or "activators," and in many cases even in very small quantities raise the catalytic activity in a marked degree. Among such substances are the oxides, hydroxide, and salts of the alkali and alkaline earth metals and generally those metals whose oxides are not reducible by hydrogen.

Having briefly outlined some of the more important features relating to catalysts and catalysis in general we will now consider one or two important industrial applications.

Fat Hardening

Solid fats are mainly composed of the glycerides of the saturated palmitic and stearic acids respectively, whereas fatty oils and liquid fats mainly consist of glyceride of oleic acid. Oleic acid is an unsaturated acid and may be converted into the solid stearic acid by the addition of one molecule of hydrogen to each molecule of oleic acid; similarly the liquid triolein may be converted into the solid glyceride tristearin.

$$C_3H_5(OOC C_{17}H_{33})_3 + 3H_2 = C_3H_5(OOC C_{17}H_{35})_3$$

Liquid fats are essentially cheaper than solid fats and have a much more limited application. For example, in the case of soap making, liquid fats can only be used for the preparation of soft soaps, also fish and whale oils are unsuitable on account of their disagreeable odour.

It will be apparent that the conversion, economically, of a liquid oil or fat into a hard fat would be a boon to industry. Superficially it looks as if such a conversion would be a simple matter. Oleic acid is, as it were, the next door neighbour to stearic acid, differing from it by less than 1 per cent. of hydrogen. But the introduction of this small amount of hydrogen is not so simple. In fact, Lewkowitsch (*J.S.C.I.*, 389, 1897), referring to the ease with which the lower members of the oleic series are converted into saturated acids, states that "oleic acid itself resists all attempts at hydrogenation." Prior to this, however, Goldschmidt (1875) had reduced oleic acid by means of hydriodic acid and red phosphorus at 200–210° C., and during the next twenty years many methods were put forward, but whilst in some cases they were fairly satisfactory, they were unsuitable for technical application.

The work of Sabatier and Senderens laid the foundation for the modern process of hydrogenation of oil. They discovered the effectiveness of nickel and certain other metals as carriers of hydrogen and showed that unsaturated compounds could be converted into the corresponding saturated compound by contact with hydrogen in presence of a catalyst or carrier such as finely divided nickel. They subsequently showed that the method was one of general application. Numerous patents have been taken for commercial methods for the catalytic "fat hardening processes." The first English patent was in 1903 (E.P. 1515), in which it is claimed that the hydrogenation of oils and fats in the liquid condition may be effected by exposing a fat or fatty acid to the action of hydrogen and a hydrogen carrier such as nickel.

Nickel as a Catalyst

The activity of nickel as a catalyst depends largely upon the method of preparation; both catalyst and hydrogen must be freed from such impurities as inhibit the activity of the catalyst. The most important "poisons" to be avoided are sulphur, phosphorus, arsenic, and their volatile compounds, chlorine, ammonia, oxides of nitrogen, etc. The quantity of catalyst which gives the maximum result, and also the most suitable temperature, must be determined. Thus 0·5 per cent. nickel gave practically no absorption at 250° C, with 1 per cent. catalyst absorption was slow at 180° C. and rapid at 250° C., whereas with 5 per cent. nickel, absorption was much greater at 180° than with 1 per cent. at 250°. There is a definite range for maximum velocity which for a number of fatty oils is approximately 180° C. when nickel is the catalyst. The range of temperature varies with the catalyst employed. In the case of edible oils rapidity of absorption is of vital importance since it reduces to a minimum the solution of the catalyst itself. It must be noted that once the catalyst is wetted with the oil there can be no actual contact with the hydrogen, the gas reaching the catalyst by solution in the oil, but rapid agitation tends to keep saturated oil in contact with the catalyst.

Nickel is used in a number of different forms, e.g., as nickel powder, thin films, nickelised asbestos or deposited on kieselguhr or pumice (about 4 per cent. Ni.), or again the nickel may be introduced in the form of the carbonyl compound, along with the hydrogen, and when the hydrogenation is carried out at 220°–240° the carbonyl compound is decomposed depositing the nickel in a nascent and highly active condition, such that 0·1 per cent. nickel is sufficient to give excellent results.

Other catalysts proposed are cobalt, copper, oxides of nickel, and certain iron salts of organic acids, such as formates, acetates and lactates. By varying the degree of hydrogenation, fats of various degrees of hardness may be obtained.

A fat of the consistency of lard or a very hard fat may be obtained as desired.

Hardened fats are now extensively used in the manufacture of soaps, and in this country the fat hardening process has been brought to a high degree of perfection by patient research carried out at the laboratories of Joseph Crosfield and Sons, Ltd., in connection with which the names of E. F. Armstrong and T. P. Hilditch should be mentioned. Many hardened oils are fit for food, and even fish and whale oils may be completely deodorised by contact with hydrogen. Hardened vegetable oils from the palm kernel, soya bean, pea nut, etc., are used in the manufacture of certain food products. It is essential, however, that the oils should be neutral, and high temperatures avoided, so as to reduce to a minimum the dissolution of the catalyst. Hardened oils also find application for lubricating purposes, and in the tanning industry.

Vulcanisation of Rubber

Magellan stated in 1772 that india-rubber or caoutchouc was good to remove pencil marks. A piece was sent to Priestley, who cut it into small cubes and distributed them to his friends to erase their mistakes in writing. The natives of Peru used india-rubber for waterproofing their shoes, but its application was limited, since it became too sticky and gave off an offensive odour in hot weather. Mackintosh (1825) made his name immortal by using a layer of rubber between two cloths. Ludensdorf (1832) found that the gum could be hardened by treatment with sulphur dissolved in turpentine. Goodyear spent many years trying to devise a method for hardening rubber, and one day in 1839 he chanced to drop on a hot stove a mixture of caoutchouc and sulphur; the two substances fused together and produced not a soft sticky mass but a tough, stable, elastic solid. Goodyear found that he could vary his vulcanised rubber; a little more sulphur gave a hard product which could be softened by heat and could be moulded into any desired shape, i.e., he produced vulcanite.

The original method of vulcanisation (devised by Goodyear) of mixing the rubber with suitable proportions of sulphur and subjecting the mixture to a temperature of 135–140° for periods ranging with the amount of sulphur, was too long a process, and it was found that the process could be hastened by the addition of magnesia, litharge and lime as sulphur carriers or accelerators. These accelerators, in quantities from 5 per cent. upwards, considerably reduced the period required for vulcanisation. More recently, organic bases have been successfully used as accelerators. The activity of organic catalysts is related to their basic and alkaline properties and it has been found that they should possess a dissociation constant of not less than $1{\cdot}10^{8}$. *p*-Phenylene-di-amine, aldehyde ammonia, benzylamine, naphthylamine, and the bicarbonate of aminoguanidine are used as accelerators. Some manufacturers prefer to use hexamethylene-tetramine, others thiocarbanilide. Some of these accelerators are comparatively mild, whilst others, especially the di-thiocarbamates and di-thiuramdisulphides are exceedingly active. Very much smaller quantities of organic accelerators are as a rule required than of such substances as magnesia. This difference, according to Twiss, is due to the fact that organic substances are soluble and therefore fairly uniformly distributed, whereas the inorganic substances are only sparingly soluble and hence not so uniformly distributed.

The advantages derived from the use of accelerators may be summarised as follows:—

(*a*) They hasten the time of vulcanisation, which in a normal mixing of 90 per cent. rubber and 10 per cent. sulphur may take three hours at 140°. This reduction of time allows greater output for a given plant.

(*b*) Vulcanisation may be carried out at much lower temperatures, so that dyestuffs may be used which would otherwise fade considerably at higher temperatures.

(*c*) They permit vulcanisation in mixtures of low sulphur content. Normally in mixings containing over 5 or 6 per cent. sulphur, a fair proportion of the sulphur remains uncombined and tends to crystallise out, giving rise to what is known as "blooming"; this would, of course, obscure the actual colour of a coloured article. By using accelerators vulcanisation proceeds in presence of lower sulphur proportions, very little free sulphur is left, and blooming does not take place.

(*d*) The physical properties of vulcanised articles can be improved by accelerators, along definite lines.

Bagasse for Steam Generation

Tests in South Africa

As a rule much more efficient results than represented by the present average figures can be obtained with low grade fuels used for steam and power generation. Thus even if the material is merely a waste product and available in abundance it is still a considerable advantage to adopt scientific methods so as to increase the rate of evaporation per boiler unit and cut down, for example, capital costs and labour charges.

In this connection some interesting boiler plant tests have been carried out on a South African sugar plantation using bagasse (sugar cane refuse). In general with double crushing on modern principles about 25 tons of bagasse are obtained from every 100 tons of sugar cane, and the analysis of the residue obtained in this way is generally, say, 40 per cent. water, 50 per cent. woody matter, 9·5 per cent. sugar and other organic substances, and 0·5 per cent. ash, with a net heat value of 2,500-2,750 B.Th.U. per lb. Under good conditions the results obtained with this material as fuel under steam boilers are generally about 2·25 to 2·75 lb. of water from and at 212° F. per 1·0 lb. of bagasse. Very often, however, the figures are much below this in actual practice, while the bagasse may have 45-50 per cent. of water. The determination of the actual net heating value of such material, allowing for both the free or added moisture and that formed by the combustion of the fuel, which in the dry state contains about 6 per cent. hydrogen, is also a complicated matter, and it is high time standard methods were adopted for fuel analysis in general.

Design of Plant Used

In these South African tests a "Turbine" forced draught steam jet furnace, together with a special design of vertical coking arch to suit, was fitted on a small water tube boiler. This had a heating surface of 2,200 sq. ft., rated at 6,700 lb. of water per hour on good coal, and the furnace equipment replaced the ordinary step-grate bars hitherto employed. There was no means of accurately weighing the amount of bagasse used on the tests, but the evaporation was increased from 4,625 lb. per hour to 6,784 lb., that is, about 47 per cent., higher than the rated figure for coal, so that extra boiler plant as originally intended was no longer necessary. Also the carbon dioxide rose from 9·5 per cent. to 13·4 per cent., and the temperature of the combustion gases from 410° to 580° F., clearly indicating the increased efficiency of the combustion. The general principle of the vertical arch design employed is on the usual lines of enabling the heat obtained by the burning of the highly volatile constituents of the fuel to be retained in the brickwork to aid the combustion of the residual "coked" material, but a certain regulated amount of secondary air is also used to ensure the complete combustion of these easily volatile products, a considerable advantage in practice.

Gas Fuel from Sewage

An article in the American *Journal of Chemical Education* (January, 1926) states that the production of light and heat from the gas obtained as a by-product in the treatment of sewage is a practicable possibility, according to the report made by the Illinois State Water Survey to the Board of Natural Resources and Conservation of that State. Experiments conducted by the Survey indicate that in a city of 50,000 inhabitants the quantity of combustible gas given off each day by the sewage in the treatment tanks is more than 90,000 cubic feet. This gas contains 70 per cent. methane, the chief combustible constituent of natural gas, and has a heating value equivalent to 700 British thermal units per cubic foot, while the value of the common fuel gas is 550 to 600 units. The other constituents of the gas, carbon dioxide, and nitrogen are inert, and the gas itself has no more odour than ordinary fuel gas. The gas is produced in the digestion process which the sewage liquor undergoes in the Imhoff treatment tanks, and formerly escaped into the air. It has been known for a number of years that this product will burn readily, but city officials and sewage plant operators have not heretofore realised the gross value of the gas that goes to waste each day. The Illinois State Water Survey, with funds assigned by the Chemical Foundation, is experimenting with the collection and utilisation of this gas and is developing a new type of treatment tank which is designed to give the maximum yields of gas.

Chemical Society's Annual Meeting

Dr. A. W. Crossley's Address

THE Chemical Society for the first time in its history held its annual meeting outside London, at Manchester University on Thursday, March 25.

After the formal business meeting Dr. A. W. Crossley, director of the British Cotton Industry Research Association and retiring president of the Society, delivered his address.

British industry, he said, had worked on virgin soil in the past, and had worked it right to starvation point, owing to the lack of appreciation of the importance of science generally from the point of view of national welfare. The lessons apparently learnt during the war seemed in the following years to be forgotten, yet our brains must be used to resuscitate our industrial soil if industry was to continue to be a profitable undertaking.

"If a country can manufacture goods," Dr. Crossley said, "of superior quality, of constant novelty or of exceptionally high performance, at reasonable prices, and keep on doing so, other countries are compelled to buy from it. Science is the modern key to such a situation, and new discoveries in science are essential to maintain the industrial position of this country; in fact, science is the sentinel that must be posted at the door of every business house with the main object of preventing loss from want of knowledge."

Government Assistance in Research

Insisting on the importance of research on well-ordered lines, Dr. Crossley pointed out that it was not till 1914 that any real attempt was made to organise the scientific workers of this country, with the result that the Research Advisory Council was set up in 1915. From this had developed the Government Department for research, "which in the short time it had existed has done more for the organisation of scientific effort than has ever before been done in this country." The initial difficulties had been overcome with great skill, and Research Associations had been formed by specific industries.

Since nearly 90 per cent. of all the firms in the cotton industry were members of the Research Association, and also largely due to generous help by the Cotton Trade War Memorial Fund Committee, the annual income of the Association was for the next four years approximately £54,000. It had therefore been possible to establish laboratories wherein "the fundamental problems lying at the basis" of the industry could be attacked, for which purpose organised and co-operative research was absolutely necessary.

It was hoped at first, Dr. Crossley said, that after five years the associations would have done so much for the trade that further Government help would not be necessary. The British Cotton Industry Research Association was founded in 1920, its laboratories were opened in March, 1922, and it was only now, six years after its creation, that the Association was really getting into intimate contact with the trade, which was recognising that science was capable of rendering assistance. Though initial advances might have been slow, future progress would be greatly accelerated by the better understanding of the fundamental problems which had been the subject of research.

The movement must lead ultimately to greater trade efficiency, to the expansion of trade, and to greater employment both of scientific and industrial workers.

It had been frequently urged, said Dr. Crossley, that it was undesirable, not to say wrong, to devote public money to industrial research, which should be supported entirely by the trade concerned. There was a very good answer to this criticism. Truly successful research was rarely without benefit to mankind at large, and one need not do more to emphasise this point than refer to the life work of such a man as Pasteur. As regards industrial research it might safely be said that the fruits of such research were always for the public benefit. It had been estimated that the research work of the General Electric Co. of America was saving the American nation at least a billion dollars a year in the matter of electric light.

Those industrialists who founded research laboratories did so perhaps mainly in the hope that their business would thereby be expanded. They further realised that this must lead to greater employment both industrially and scientific, for scientifically controlled production meant methodically certain production, with less expense of mental effort and therefore more of the latter for devotion to other work. When results were forthcoming, the public, which had staked nothing, received the benefit every time. Why, then, should not the public contribute to the cost of research from the results of which they benefited so largely?

No matter how much criticism was levelled at the Department of Scientific and Industrial Research, it still remained a fact that its activities had led to an organised effort to bring science and industry together, an effort which had already been crowned with distinct success and which would lead to a great future, if all those interested looked at the movement in the true national spirit and did what they could to support and further it. For, in reality, it was a distinct step towards the organisation of the immense research power of this country. The ultimate justification of all expenditure on industrial research from public funds must be found in the consequent application of scientific knowledge in and by industry.

If the results of research were to be effectively applied, Dr. Crossley emphasised the necessity of industry meeting science half way. Every industrialist could not be a trained scientist, but he could at least guard himself by employing trained scientists in his business. The Britisher had been described as a confirmed individualist, but we should realise that there was much unselfish and co-operative national work to be done. The never-ending seaich for new knowledge was the exacting price which must be paid for survival under modern industrial conditions.

Too Stereotyped Training of Chemists

In the final section of his address Dr. Crossley dealt with some of the problems of teaching and training for research. Industry, he said, required chemists with broadly differing lines of training and our present training was too much stereotyped, leading to the production of extraordinarily good men, but men of one type only. After describing some of the varying types of chemists that industry required, Dr. Crossley said he doubted whether we were doing our best for our future chemists, or for industry, by putting them all through the same courses of study. He suggested, incidentally, that chemical engineering might be made an extra degree subject. He had often seen a look of astonishment and blank dismay come over the face of a young chemist when he had been faced for the first time with a working drawing of a piece of chemical plant, and there was certainly no reason why every future industrial chemist should not be taught sufficient of machine drawing and design to enable him to read those drawings with ease.

Tribute to the B.D.C. Scheme

Industry had not done anything like enough to co-operate with the teaching profession in the training of young chemists, but it was very encouraging to hear of the work which had recently been done in this direction by the British Dyestuffs Corporation in conjunction with some of the universities.

Officers Elected

A vote of thanks to the President proposed by Professor W. P. Wynne, and seconded by Professor W. H. Perkin, was carried with acclamation. Dr. Crossley replied.

It was then announced that the following officers had been elected:—President, Professor H. Brereton Baker. Vice-Presidents, who have filled the office of President: Dr. Arthur W. Crossley, Professor Percy F. Frankland. Vice-Presidents, who have not filled the office of President: Sir Robert Robertson, Professor Robert Robinson. Ordinary members of Council: Town Member, Dr. R. H. Pickard; Country Members, Professor H. V. A. Briscoe, Professor R. Whytlaw Gray, Dr. T. J. Nolan, Professor K. J. P. Orton.

A vote of thanks to the University for the use of the Lecture Theatre was proposed by Dr. Crossley and acknowledged by Professor Ackworth.

At a dinner in the evening Professor H. B. Baker presided, and in a short speech referred to the necessity of increasing the financial resources of the Society.

Sir Percy Woodhouse referred to the Society's activities as of the greatest importance to Manchester commercial men. He referred to the greatly increased number of dyes produced

in this country, and this improvement was due to a great extent to the Chemical Society. He firmly believed that the chemist would save the country.

Some 14 members of the Council were able to accept the invitation of the British Dyestuffs Corporation to visit the laboratories and dyehouse of the B.D.C. at Blackley and were afterwards the guests of the Corporation at a luncheon.

Chemical Fermentation Processes

Dr. Weizmann's Patent Upheld

MR. JUSTICE ROMER, in the Chancery Division on Tuesday, delivered his considered judgment in the action by the Commercial Solvents Corporation, Ltd., against Synthetic Products Co., Ltd. (THE CHEMICAL AGE, January 16, 23, 30 and February 6 and 13.) The plaintiffs claimed an injunction restraining the defendants from infringing their patent No. 4,845 of 1915 relating to the fermentation of maize starch by means of a bacillus isolated by Dr. Charles Weizmann, so as to produce on a commercial scale acetone and butyl alcohol. Defendants claimed revocation of the patent, alleging that the information on which it was based was obtained by Dr. Weizmann confidentially from Professor Fernbach, Mr. Edward Halford Strange and scientists engaged in 1912 in investigating fermentation processes.

His lordship said the defendants alleged that Dr. Weizmann obtained information from them in breach of faith. During the course of the trial, however, the defendants very properly withdrew the charge so far as it reflected on Dr. Weizmann's honesty and integrity, but they still maintained that he obtained the process from the gentlemen referred to. The only bacteria of importance in connection with the question of "obtaining" was the "F. B." isolated by Professor Fernbach which was sent to Dr. Weizmann in 1911. He found this to be a good fermenter of potatoes, but that it was not quite so successful with maize—a conclusion that was fortified by experiments made by Mr. Ballantyne and Professor Andrewes. His lordship said he was satisfied that the bacillus "F. B." could not be used for the fermentation of maize without the use of nutriment or hydrolysis. He was satisfied, however, that Dr. Weizmann learned nothing about this heat treatment, but even if he did the information was not the secret of "the group" because the fact that ferments could be made more vigorous by the heat treatment had already been published. One more piece of information that, according to Mr. Strange, was obtained by Dr. Weizmann, was the first step taken to isolate the doctor's own bacillus "$\beta\gamma$." This was not mentioned by counsel or any other witness called for the defence except Mr. Strange. He was satisfied in this part of the case that "F. B." and "$\beta\gamma$" were different species of bacilli and that "$\beta\gamma$" possessed powers of fermentation materially greater than those possessed by "F. B." Whereas "$\beta\gamma$" liquefied gelatine "F. B." did not. "$\beta\gamma$" was not so sensitive to oxygen, and "F. B." could not ferment unhydrolysed grain with or without stimulant. He was of opinion that Dr. Weizmann succeeded in isolating "$\beta\gamma$" without making use of any information given to him by any member of "the group," or obtained by him from association with them.

The Patent Specification

Next his lordship dealt with the plaintiffs' specification and the question whether the patent was valid. The invention was that of Dr. Weizmann alone and it proved to be of the greatest assistance to the country during the war when acetone could not be produced satisfactorily by any other known process. He found that the invention did not lack novelty, that there was ample subject-matter, and that there was no insufficiency and no prior user. With regard to prior user he said the evidence in support of it was supplied by Mr. Strange and Mr. Kane. He could not help thinking that they resented very deeply the displacement of their process by that of Dr. Weizmann in 1916 when the Government took over the defendants' King's Lynn works for the production of acetone, and that they entertained a very hostile feeling towards Dr. Weizmann and that that hostility, he was willing to believe, unconsciously coloured their evidence as to what took place at King's Lynn in 1915 and 1916. The defendants' attack on the validity of the plaintiffs' patent had completely failed and he must give the plaintiffs the relief they asked for. He dismissed the counter-claim with costs.

Sir Duncan Kerby, K.C., for the plaintiffs, in asking for costs on both the claim and the counter-claim on the higher scale, said this was the first bacteriological case that had ever come before the courts.

His lordship granted the application.

Power Alcohol from Vegetable Products

Dr. Monier-Williams Outlines Difficulties

THE possibility of producing industrial alcohol on a commercial scale from vegetable products was discussed on Monday by Dr. G. W. Monier-Williams, of the Ministry of Health, in a paper read to the Farmers' Club in London.

Dr. Monier-Williams first dealt with petrol, which was now selling at 1s. 7d. a gallon—a price at which no other suitable liquid fuel, except benzol, could compete with it. At the same time, it could not be said that all fear of a possible shortage within the lifetime of the present generation had been removed. Estimates of the oil reserves in America varied greatly. Some authorities gave the life of these oilfields as 25 years, or even less. Others put it at 100 years or more. He read figures showing that America produced 70 per cent. of the world's mineral oil, and consumed 80 per cent. of the available motor fuel, so that our own demands and those of the rest of the world must be mainly, if not solely, met from other sources.

Alcohol could be produced only from those parts of the plant which could be fermented by yeast—from sugar, starch, and to some extent cellulose. But in the fermentation of sugar less than half the sugar was actually obtained in the form of alcohol, the remainder being converted into carbonic acid gas and wasted.

High Costs

The yield of alcohol from potatoes was only 7 per cent. of the total weight of the crop, cereals (grain and straw together) 13 to 16 per cent., and wood 5 to 7 per cent. Thus, they had to grow, harvest and transport to the distillery a considerable weight of raw material for every gallon of alcohol produced, and this cost money.

Dr. Monier-Williams estimated that, taking the value of potatoes on the farm, the raw material would cost 2s. 5d. per gallon of alcohol produced, and this before actual manufacture was started. The corresponding figure for sugar beet was 2s. 6d.; mangolds, 2s. 5d.; and grain, 2s. 3d. Under present conditions, therefore, it would be difficult to produce alcohol from crops in this country for much less than 3s. per gallon in bulk at the distillery.

In Germany, the wholesale price of synthetic methyl alcohol was round about 3s. 7d. a gallon, but the author showed later in his paper that this industry had to be heavily subsidised to compete with alcohol derived from imported molasses and from other sources, still less with mineral oils. If, he added, we could find a bacterium or mould that could convert cellulose—straw and wood—quickly and completely into sugar, it would be a great step in the production of cheap industrial fuel. But all attempts to find such an organism had so far been unsuccessful.

America's Supply of Helium

"THE nation is squandering its world monopoly of helium, precious to the national defence," Dr. Richard B. Moore, of New York, former chief chemist to the U.S. Bureau of Mines, declares in a statement just made public through the American Chemical Society. Action by Congress, he asserts, is essential if the United States is to husband and utilise this unique natural resource. The Navy fliers need helium, but adequate supplies are beyond their reach. It is up to Congress to provide the necessary funds. Meanwhile, Dr. Moore states, 600 or 700 million cubic feet of helium are going to waste every year in our natural gas, and it becomes increasingly difficult to get an adequate supply for reservation without unduly affecting industry or the convenience of local users. Every airship disaster during the last few years has resulted in the burning of the ship, with the exception of the *Shenandoah*, which was filled with helium. Most of the German ships destroyed before and during the war had the same experience. Fire either started the disaster or was an accompaniment of it. "People," he states, "who talk glibly about the absolute safety of hydrogen filled airships are either stupid or have an ulterior motive. The United States has in its helium resources a natural advantage that should not be given up for one moment in exchange for interested and prejudiced talk."

Chemistry in the Science Museum

By Alex. Barclay, A.R.C.S., A.I.C.

It will no doubt interest many to hear that the new collections in the Science Museum, South Kensington, illustrating chemistry and the chemical industries, was opened to the public on April 1. The restricted accommodation that has been available in the past has now been increased to 8,000 sq. ft., and with the consequent reorganisation of the collections it may be said that this country will shortly possess a museum representation of pure and applied chemistry as good as any to be found in the world. Even this increase of space does not allow chemical industry to be represented adequately, and, as the building of the new Science Museum progresses, it is hoped to continue the development of this branch still further. Apart from this, however, the visitor can already learn something of many of the industries that owe their very existence to the chemical processes involved and to the work of men who, spending their time in the laboratory, have made the fundamental discoveries upon which many of these industries have been built and which in course of time have rendered possible the annual production of thousands of tons of chemical materials.

For those who are interested in the history and development of the science there is abundance of material for study. It is hard to realise, for instance, that only a century and a half ago Joseph Priestley discovered oxygen by using a burning glass of no less than one foot in diameter with which to heat the substance from which the gas was expelled. If the reproduction of his simple apparatus, which is exhibited, is compared with that of modern forms, the difficulties then attending accurate experimental work will be readily understood and the rapid strides with which chemistry has advanced since that time will be fully appreciated.

Again, by looking at the reproductions of John Dalton's symbols and diagrams used in 1803 for the enunciation of his famous atomic theory, the first theory to provide a sure foundation upon which the science of chemistry could rest, it will be realised how many important discoveries have been made in a little over a hundred years, since now it is hard to find any branch of human activity in which chemistry does not play an important part.

Many other interesting historical objects can be seen in the collections, among which are two of the first specimens of benzene prepared by Faraday in 1825 and the original apparatus used by Thomas Graham, who first distinguished between colloids and crystalloids. There can also be seen the first synthetic rubber specimens prepared by Tilden in 1892, Crookes's original specimens of the metal thallium and its compounds, and a copy of the iridio-platinum apparatus with which Moisson isolated the element fluorine in 1886.

From a modern standpoint, such interesting subjects as the chemistry of synthetic dyes, the rare earths and the radio-elements, and the formation and classification of crystals may all be studied here before very long. Mention should be made also of the objects which illustrate electrochemistry, the relation between the colour and the constitution of organic compounds, the fine set of models illustrating stereo-chemistry and the benzene theory, and the large range of specimens and apparatus representing colloid chemistry.

The methods employed in the chemical analysis of substances are fully illustrated and the apparatus used in 1831 by Liebig for the analysis of organic materials may be compared with the modern Dennstedt form, used with an electric furnace. There is a very good collection of gas analysis apparatus and of apparatus used in the testing of oils, foods, and like articles.

In the section devoted to chemical industry, one may follow by means of excellent models the processes adopted for the manufacture of chemicals and allied products on the large scale, both historically and from the point of view of present practice. The manufacture of sulphuric acid is the key to most other chemical manufactures, and its preparation in small quantities can be traced back as far as the tenth century. Its manufacture by means of lead chambers is illustrated historically in the collections. The manufacture of soda by the method invented by Leblanc in 1781 can also be seen, and it is interesting to note that although this process was for many years the only method of preparing soda, its inventor, by being compelled to make his process public, was reduced to starvation and committed suicide in despair, a sad reflection on the times in which he lived.

Perhaps one of the most interesting groups of exhibits shows the manufacture of alcohol and potable spirits. The production of malt whisky can be followed in all its stages by means of large models, and can be compared with the modern method of producing grain spirit in a Coffey " patent " still.

The manufacture of explosives, which has probably caused more general interest since the war than ever before, is well represented, and there may be seen in the collections many interesting models of plant for the manufacture of guncotton, nitroglycerine, and black powder.

Other manufactures are represented by models describing the preparation of nitric acid, white lead, mineral oil distillation products and coal tar products, and there is an up-to-date series of specimens illustrating the manufacture of artificial silk.

British Association of Chemists

The Ideal Works Chemist

The subject of the training of chemists has of late been again to the fore, and since the Association includes within its ranks chemists who have been trained in varying ways, and above all a large number who are employed in works, it is qualified to express an opinion upon the matter of the training of the works chemist.

From the professional point of view, the vital necessity of sound theoretical training is obvious, for, however the matter may be regarded, it does guarantee at least a rough standard of capacity and competency ; but on the other hand it must be remembered that this standard is the standard of the chemist, not that of those with whom the newly-fledged chemist is thrown in contact when he enters upon an industrial career, and it is that point of view which will be the determining factor in success or failure.

It is common experience to find the so-called practical man stepping in where the chemist fears to tread, and this is due in great measure to a particular type of knowledge which the practical man possesses, but which the chemist lacks. He can tell the employer, in the layman's own language, what the employer thinks he wants to know. This is not to say that he does, or intends to, deceive, but he knows his man, knows what to say to him, and how to say it. Business men are inclined to be suspicious ; there is nothing more suspicious than the technicality too technically explained. This important detail points a far-reaching moral. The practical man can learn this, and the chemist can learn it also if he is taught.

It is for this reason that a chemist trained in a works, with perhaps inferior academic qualifications, frequently succeeds where his academically more brilliant colleagues may fail.

There is on the whole very little wrong with the system of chemical training in our universities and technical schools, but there is a tendency to insist more and more upon a supplementary training in works. This is necessary, not so much from the point of view of the practical application of chemistry to industry—the universities understand that requirement well enough—as for that human type of experience that, if intelligently applied, it would impart. In this connection there could be no better training for the student than that he should be required to explain to those without technical knowledge in language they could not fail to understand roughly the meaning of, for example, hydrogen ion concentration and how it might affect, in practice, a given operation. It is here that the engineer has the better of the chemist. He has passed through the shops where, apart from the practical experience gained, he has rubbed shoulders with many different types of human beings. It is exactly that which the young chemist requires.

This principle has another and a wider application. It is not true that the public is not interested in chemistry, but they are not interested in the chemist. The doctor can interest the patient in his ailment or, if he is wise, in other people's ailments. The engineer can interest the public in his bridge. The chemist could interest the public, his employer, even perhaps his wife in the isotopes if only he knew how, intelligently, to explain them, but he does not, and he must learn.

H. T. F. Rhodes.

French Coal Tar Distillates

Compulsory Extraction of Benzol for State Use

NOTIFICATION from the French Government, making the extraction of benzol from coal gas compulsory for State purposes, was announced by Dr. Charles Carpenter, the chairman of the European Gas Company, Ltd., at the general annual meeting of the shareholders in London on Thursday, March 25. This State provision, Dr. Carpenter added, had been received at most of the company's gasworks, which are situated at Amiens, Bolbec, Boulogne and Wimereux, Caen, Nantes, Rouen and Sotteville. Unfortunately, the directors had been compelled to accept the obligation. The French Government had decreed that the gas companies throughout the country must take the benzol out of the gas and place it at the disposal of the State for munitions, dyes, and motor traction purposes, and although the compulsory bargain which had been made between the gas undertakings and the Government was a matter for regret, there appeared to be no way out of it. It was now the law of the land, and if the State required the gas companies to lay down an expensive plant in order to extract the benzol from the gas they would have to obey.

As to residual products generally, the French market had been weak during the last few months. Tar, however, he was pleased to be able to state, was becoming increasingly popular among French road engineers and surveyors for main road construction, and he hoped that, when the general conditions of that country improved, the company would be in a position to obtain higher prices for it than the existing moderate figure.

With respect to sulphate of ammonia, the outlook was by no means so hopeful, because there appeared to be a growing tendency among the agricultural classes to use the synthetic product for purposes of fertilisation. Both France and Germany had industrial concerns which, he understood, were turning out large quantities of synthetic ammonia, and naturally that product entered largely into competition with the sulphate of ammonia produced in gasworks.

Recent Research on Coal

Methods and Classification

AT the annual general meeting of the South Wales Section of the Society of Chemical Industry, held on March 19 at Swansea, the election of Mr. W. J. Cooper, vice-chairman, to the chairmanship was announced and also of Mr. A. M. O'Brien to be vice-chairman. The retiring chairman, Mr. C. A. Seyler, chose as the subject of his address " Some Aspects of Recent Research on Coal."

Mr. Seyler said that no attempt at organised coal research had been made in this country till the establishment of the Fuel Research Board in 1917. Even now we had only arrived at the stage of the standardisation of the methods of analysis and sampling upon which the whole structure of research must rest. Consequently there was no body of really reliable data in existence for British coals. He deprecated the misunderstanding of the use of the ultimate analysis of coal and the reliance solely upon volatile matter. He stated that two independent variables were needed to assign to a coal its place in any classification. In his opinion the carbon and hydrogen were the most satisfactory, but he also showed by means of a chart that whereas the volatile matter or calorific power alone was useless as a basis of classification, a combination of the two gave approximately the same results as the ultimate analysis, and would cause the British and American classifications to fall into line.

He distinguished two essential ways in which coals might differ. They might differ in what the Americans call " rank " while remaining as the same kind or genus. The rank of a coal was best indicated by the percentage of carbon. Changes of rank were not due to the nature of the vegetation from which the coal was derived, or to age. They were probably caused by dynamo-chemical changes, such as thrust-pressure, after the vegetable matter was buried. Differences in kind or genus were more fundamental. They were best indicated by the percentage of hydrogen, and the differences were due to biochemical causes, either an initial difference in the vegetable matter or to differences in the process of bacterial and fungal action. Thus cannels were derived from material initially rich in hydrogen. In particular, Dr. Thiessen had recently shown that Boghead cannels were derived largely from algæ whose cell-walls consisted of a fatty instead of a ligno-cellulosic substance. Dr. Thiessen had investigated a similar alga, which he named Elaeophyton, which still lived off the coast of Australia.

In the speaker's opinion it was by a co-operation of the coal chemist, the bio-chemist, together with the botanist and geologist that future progress was to be expected. He stated that the investigation of the action of organic solvents upon coal had proved somewhat disappointing. Much was to be expected from an investigation of the conversion of plant material into ulmins and the regeneration of the ulmins from coal which had been effected by Dr. Wheeler and his assistants by the oxidation of coal. It was disputed whether cellulose or lignin was the chief source of the ulmins. There, again, was needed the co-operation of the bio-chemist and botanist.

Striking Boiler Plant Tests

The Value of Scientific Methods

THE control of modern power station boiler plant to-day is essentially a specialised branch of chemistry and engineering, and the application of scientific methods of control has done much to render possible the highly efficient results now being obtained on a number of plants. A striking indication of the advances made are the figures that have been obtained during recent trials carried out at the Grove Road station of the Central Electric Supply Co., St. John's Wood, London. The boiler consists of a " Babcock and Wilcox " unit of the " land type marine " having a normal evaporation of 60,000 lb. of water per hour, operating at 200 lb. pressure and 625° F. steam temperature with a heating surface of 8,619 square feet, while the superheater is 3,190 square feet. Also there is included a " Green " economiser of 4,620 square feet heating surface, and a " Usco" air heater of 9,130 square feet, containing 110 thin metal plates electric welded within the outside casing so as to avoid leakage, giving alternate 1 in. passages for the cold air and hot gases.

Results of Tests

The boiler is fired by three " Underfeed Class A " travelling grate stokers, with a total grate area of 308 square feet, installed by the Underfeed Stoker Co., Ltd., of London, while both forced and induced draught fans are fitted of the " Sirocco " type, by Messrs. Davidson and Co., Ltd., of Belfast. The coal used is of a very moderate quality, scotched washed peas with 13·6 per cent. moisture and a calorific value as fired on the lower or net heating value of 10,600 B.Th.U. per lb., and Stanley slack of 10·3 per cent. moisture and 10,000 B.Th.U. The chemical analysis of the flue gases showed 11·5 to 12·25 per cent. carbon dioxide, without any carbon monoxide or unburnt products, while the temperature of the gases as leaving the boiler varied from 540° to 560° F. The feed water economiser raised the feed water from 165–170° F. to 250–270° F., while the average temperature of the cold air entering the heater was 103–107° F. with 237–245° F. as delivered to the stokers, the average velocity being about 535–629 feet per minute. Further, the flue gases from the economiser entered the heater at 346–358° F. and were finally reduced to only 255–262° F. on entering the chimney base, a noteworthy figure only possible by great attention both to design and control.

The average efficiency works out between 83·2 and 85·8 per cent. on the higher or gross heating value of the coal, as more generally taken, although the whole subject of fuel analysis is in hopeless confusion, without deducting the auxiliary power used. If, however, the fans and stokers are allowed for, the resulting net efficiency—still on the higher heating value of the coal—is 82·4 to 85·1 per cent., while if the lower or so-called net heating value of the coal is used, with allowance for the hydrogen content, the figures are 85·6 to 88·4 per cent., with the deduction of the auxiliary power, or 86·4 to 89·2 per cent. without. Also 12·45 lb. of air per lb. of fuel is used as compared with 8·50 lb. for the theoretical, a very fine figure, while the water evaporated per lb. of coal as fired is 7·235 to 7·889 lb., equivalent to 8·99 to 9·76 lb. from and at 212° F., while still higher results could be obtained by using fin-tube, water cooled walls.

Institution of Engineering Inspection

Paper on Lubricating Oils

A PAPER on lubricating and allied oils was read by Mr. E. A. Evans at a meeting of the above institution, in London, on March 19.

Mr. Evans said that while lubricating oils in the past consisted almost entirely of fatty oils, which still had a definite value, the latter were now almost entirely eclipsed by mineral lubricating oils, which were free from rancidity, acidity, drying on exposure to air, etc. The two aspects of lubricants were, firstly, the lubricating value, or power to reduce friction, and secondly, the value of the body as a lubricant, which involved not only lubricating power, but also the characteristics it had permitting its use for specific purposes. For example, an oil for use in a steam turbine had to separate from water quickly ; it had, as far as possible, to be inert towards atmospheric conditions. Generally, mineral oils had better values as lubricants than had fatty oils, but the latter had better lubricating values.

Mineral oils were influenced by the atmosphere, especially at elevated temperatures, with the production of acid and solid decomposition products resulting from oxidation. By laboratory oxidation tests the propensity of an oil to form solid decomposition products when in use could be determined. Such a test was given in British Standard Specification 148 of " Insulating Oils." It was not always necessarily true that the lower the oxidation value the better the oil. A lubricant adhered to moving parts by virtue of certain chemical groups possessing forces which enabled it to adhere to metallic surfaces to withstand the applied pressure. If the oil were so purified as to render it inert, its lubricating value would be seriously diminished, because in the process of refining the active groups might be removed. Hence it was necessary to compromise between lubricating value and value as a lubricant.

The Testing of Oils

The author recommended the adoption of the standard tests issued by the Institution of Petroleum Technologists in book form. Efforts to produce standard specifications for oils had been unsuccessful, the nearest approach to a complete specification being British Standard Specification 148, while a very valuable compromise was offered in the British Standard Classification of Mineral Oils. Tests of certain definite characteristics of oils, such as specific gravity, viscosity, flashpoint, etc., were very useful when considered as a whole in the light of practical experience, though any single test, by itself, denoted practically nothing. The Pensky Martin closed test for flashpoints was the standard test in England, though elsewhere the open test was used. As viscosity played a prominent part in specifications, it must be measured with some degree of accuracy and recorded in a universal way at temperatures agreed upon by common consent. The value of the coke test as a means of deciding how an oil would behave when in use was now seriously questioned. The oxidation test was the most important chemical test.

In regard to colour, blackness was always associated with suspended asphalt, and such oils were always cheaper than paler oils of the same viscosity. Low viscosity oils were invariably pale in colour after refining. Pale colour might, however, indicate much refining or mere bleaching. The specific gravity of all oils from the same source increased with an increasing viscosity. Low specific gravity did not necessarily mean low oxidation value, but oils of high specific gravity invariably had high oxidation value.

High Yield from Alberta Oils

IN comparison with the average production in other oilfields of the world, Alberta oil wells now producing show a high average. The Royalite well south of Calgary, in the Turner Valley field, is producing 400 barrels a day of almost pure naphtha, while wells in the Wainwright field east of Edmonton are producing from 80 to 100 barrels a day. This compares with an average of 6·59 barrels in 298,915 wells in the United States in 1924, with an average of 55·53 in California, of 20·9 in Texas, of 8·32 in Oklahoma, of 20·63 in Montana Rocky Mountain area, and of 41·84 in Wyoming.

Surface Combustion

Latest Refractory Materials Described

AT the meeting of the London section of the Society of Chemical Industry on Monday, Major T. G. Tulloch read a paper on " Surface Combustion."

After describing the inception of surface combustion by Professor W. A. Bone, he described and exhibited the latest form of refractory material used in surface combustion, which consisted of granules of material which could be made into any desired shape. Two samples were exhibited, viz., a large disc-shaped diaphragm or combustor, the mixing chamber for the gas and air under pressure being placed at the back, and a diaphragm made in cylinder form, the heating material being on the outside and the mixing chamber inside. The position of the heating chamber and diaphragm could be reversed so that the heating effect was inside and not out. There was an entire absence of backfire when using surface combustion, either in the first lighting of the apparatus or in the final turning off of the mixture. The large granules of the refractory material were placed at the back of the diaphragm and small ones in front, to give the best results. Major Tulloch emphasised the great economy in gas when using this system, and one particular instance was recorded in which the economy was as much as 60 per cent. Either town gas or producer gas could be used. The secret of success of the combustor used in surface combustion, said Major Tulloch, lay in the surface per pound weight.

Professor W. A. BONE, in the discussion, agreed with Major Tulloch that full credit should be given to Mr. Cox for continuing the work of the late Mr. McCourt and making the combustor or heating element the full commercial success that it is to-day. He discussed the theory of surface combustion and said he had always regarded the matter as primarily one of thermionics, and experiments recently showed a very considerable advance in proof of that idea. He believed it would be found that before gases could be burned they must become ionised. Experiments at Armstrong College, Newcastle, had shown that there was no trace of ionisation after the gases had left the surface and that they were in an absolutely electrical neutral state.

Scottish Shale Oil Crisis

Report of Court of Investigation

THE critical condition of the Scottish shale oil industry is disclosed in the report, issued on Wednesday, March 24, of the Court of Investigation concerning the wages position.

Sooner or later, it is stated, only two alternatives will be open, viz., either to close down the industry or to obtain outside help, restricted, in the Court's view, to three sources—Scottish Oils, Ltd., the Anglo-Persian Oil Co., Ltd., and the Government. A memorandum is printed at the end of the report stating that widespread ruin and financial disaster for 40,000 people residing in 30 towns, villages, and hamlets of West Lothian, Midlothian, and Lanarkshire will be the inevitable result of a closing down. Having regard to the facts in that memorandum, the Court express the opinion that the Government should co-operate with all the companies referred to in considering how best to render at least temporary assistance.

Effect of Sulphate of Ammonia Prices

Apart from the prices of oil products, says the report, the value realisable from the products of a ton of shale depends on the market price of sulphate of ammonia, about 40 lb. of which can, on the average, be obtained from a ton of shale. The price is dependent upon world influences. The world production of sulphate of ammonia rose from 716,000 tons in 1906 to over 1,500,000 tons in 1920. Since then the amount has been doubled and 1925 saw practically 3,000,000 tons produced. This increase was due to synthetic production, Germany being a large exporter and a plant had been erected in England. Prices had fallen in consequence. Taking into account the above factors which decided the value realisable for products per ton of shale it was found that in 1913/14 the price obtained was 12s. 6d. against 9s. 11d. per ton, the cost of production. In the half year to September, 1925, the figures were 12s. 5d. and 14s. 2d., a loss of 1s. 9d. per ton.

Chemical Matters in Parliament

Trade Figures

Sir P. Cunliffe-Lister (House of Commons, March 24), in reply to Sir F. Wise, gave the following details :—Exports consigned to France, and their values, in 1925 included pitch, £483,000 ; scientific instruments, £211,000 ; ammonium sulphate, £253,000 ; copper sulphate, £253,000. Exports consigned to America included China Clay, £703,000 ; tar oil, etc., £967,000. Imports consigned from Germany included chemical pulp, £217,000.

Government Lactose Factory

Mr. Guinness (House of Commons, March 29), in reply to questions, said that the Government lactose factory at Haslington was to discover an economic process for the utilisation of whey. This, it is considered, had been done. The factory had been sold publicly by tender, at a loss because of the heavy initial expenses. There was no secret process.

Petrol Prices

Mr. McNeill (House of Commons, March 29) said that, although large holders in the Anglo-Persian Oil Co., they could not control prices. They made no interference with commercial management.

Government Loss on B.D.C.

Mr. McNeill (House of Commons, March 29), in reply to Mr. Bennett, said that the capital loss arising out of the Government investment in the British Dyestuffs Corporation was £1,085,338. There was also a deficiency of interest on the Government's shares amounting in all to £716,975. There were, of course, numerous cases in which private undertakings financed by the Government for War purposes had failed to repay in full the funds advanced, or had been forced by difficulties, mainly arising from the industrial depression, which started in 1920, to make arrangements with their creditors (including the Government) involving some possibility of loss to the latter.

Coal Commission Costs

Mr. McNeill (House of Commons, March 29) said that the Coal Commission had cost about £6,200. Up to March 30 48,037 copies of the report had been sold.

Algæ and Marine Plants: Chemical Uses

In a lecture to the Société de Chimie Industrielle (reported by *La Revue des Produits Chimiques*, January 31, 1926) M. Maurice Deschiens discussed the industrial uses of algæ, especially in regard to the production of iodine and potassium salts. The harvest of algæ is worth 30 million francs in France. To produce 10 kilos. of iodine it is necessary to treat one metric ton of ash, corresponding to five metric tons of sun-dried algæ or 25 metric tons of fresh algæ. The modern tendency is towards a method of treatment of algæ which not only produces iodine and potassium salts, but also recovers derivatives of the organic matter (algine), since alginates are in demand for various purposes, e.g., sodium and ammonium alginates for use as plastic substances and dressings, iron alginate in pharmacy, copper alginate in the treatment of vine diseases, sodium alginate in the treatment of turbid liquids (wort, etc.). During the war-shortage of potassium, the United States made very extensive use of the giant algæ of the Pacific.

Aluminium Graphite Paint

A new product, Dixon's aluminium graphite paint, has been developed for use wherever an aluminium or light coloured paint is desired, such as the gas and oil industries, refineries, pipe lines, municipalities, and general industry ; on gasholders, hydrants, water-tanks, lamp posts, bins, radiators, refrigerator cars, iron and steel structural work, etc. The paint, which is being made by C. R. Averill, of 22, Duke Street, Stamford Street, Blackfriars, S.E., is composed of aluminium, flake silica-graphite, and boiled linseed oil, and forms a covering which resists the action of gases, fumes, acids, smoke, sunlight, air, and moisture. It is supplied in light and dark grey, and has a pleasing lustre, the reflecting power making it very useful in the case of tanks, etc., where coolness is desired. The estimated covering power is 600 sq. ft. to the gallon on metal work and 450 sq. ft. on wood surfaces.

Imperial College of Science

Report on Year's Work

The annual report of the Imperial College of Science and Technology, South Kensington, for the year ended July 31, 1925, has been issued. It states that early in the year they received from the Rubber Growers' Association £515, the balance of subscriptions promised to the Botanical Research Fund of the Association, making a total of £30,000. This sum has been expended on completing and fitting the southern half of the second floor of the Botany (Plant Technology) Building.

The educational work of the college proceeded satisfactorily. It was decided to reorganise the work of the department of technical optics on a post-graduate basis. Members of the college were awarded a considerable number of distinctions and one was elected to a Fellowship of the Royal Society, two students were elected to professorships elsewhere : the silver medal of the Royal Society of Arts was awarded to a member of the staff and a Rockefeller International Research Fellowship to a student. The number of students taking courses was 1,008, and 40 research assistants, a total of 1,048, compared with 1,106 for the previous year.

The number engaged solely in research was 207, compared with 179 a year ago. On the results of this work 31 higher degrees of the University of London were awarded and 97 higher diplomas of the Imperial College. The number of B.Sc. degrees awarded to students during the same period by the University of London was 147, including 111 with honours, while the number of associateships gained was 209, making a grand total of 484.

The College Appointments Board continued to place students in suitable employment. Three hundred and sixty-one individuals registered with the Board during the year 1924–5, the percentage of unemployed on the register at the close of the year being 8·3, compared with 16 a year previously.

Lime and Agriculture

The liming and chalking of land was the subject of a lecture by Dr. J. A. Voelcker, chemical adviser to the Royal Agricultural Society, at Ipswich recently.

Many people, said Dr. Voelcker, confused carbonate of lime, of which chalk was another form, with lime. Carbonate of lime was virtually limestone, chalk, or crag. It was from heated limestone, which produced lime. These were essential differences to bear in mind. A ton of lime was equal to two tons of limestone. Lime was an important constituent of plant food, and animals depended on bone largely for phosphate of lime. Lime also benefited certain root crops. Lime corrected the acidity of the soil, was necessary for nitrification and set free the potash in the soil. It also enabled the land to be worked more easily—this had been proved at Rothamsted. He could not recommend magnesium lime.

A dressing of two tons to the acre of burnt lime was necessary, said Dr. Voelcker, but of the chalk it was well to apply 10 tons to the acre. On grassland it should be applied in the autumn, and on arable on the corn stubble. It was said that fresh applications should be made on arable land after five years, and on grass after seven years, but he found at Woburn that the effect of liming the land had lasted for 22 years. In conclusion, Dr. Voelcker said it would be found that scrap lime from sugar beet works, which contained 84·8 per cent. of lime, would be extremely useful.

Mr. J. W. Rickeard in a vote of thanks, welcomed the decision of East Suffolk County Council to provide light land farming experiments at Tunstall.

The Arca De-superheater

A useful apparatus for reducing the temperature of superheated steam by any desired amount down to saturation temperature is the Arca de-superheater, which is being manufactured by British Arca Regulators, Ltd. The reduced temperature is automatically maintained constant by the Arca temperature regulator. The de-superheating plant embodies a combined de-superheating chamber and water separator. In the upper part of the body are fitted sufficient special sprays to atomise water required to reduce the temperature of the steam by the required amount. The water to the sprays is controlled by Arca regulating valves, operated by the Arca thermo relay fitted in the steam outlet.

From Week to Week

LORD LEVERHULME has purchased No. 39, Brook Street, Grosvenor Square, London, the residence of Mr. Ronald Hambro.

MR. JOHN HAWLEY, B.Sc., F.I.C., chemist at Glasgow Corporation laboratory, has been appointed analytical chemist and public analyst of Dumfriesshire in succession to Mr. James Davidson, retired.

THE WEDDING took place on Saturday, March 27, at Bournemouth, between Dr. O. R. Howell, Lecturer in Physical Chemistry at University College, St. Andrews, and Miss M. S. Morgan, of Northfield, Narbeth.

THE PRODUCTION OF ARSENIC is contemplated in Spain by a new corporation with a capital of 1,500,000 pesetas. A deposit of arsenical pyrite, which has been discovered near Castro de Rey, in the province of Lugo, will be exploited. This will be the only enterprise of its kind in Spain.

PROFESSOR CAMILLE MATIGNON, editor of *Chimie et Industrie*, has been elected to the French Academy of Sciences. He owes his election to his work as a collaborator of Berthelot and in the fixation of atmospheric nitrogen in the form of urea.

DR. DANIEL HANSON, late of the National Physical Laboratory, has been appointed to the Chair of Metallurgy at Birmingham University in the place of Professor T. Turner, who, as already announced in THE CHEMICAL AGE, is retiring in July under the age limit.

A GOVERNMENT INQUIRY into the quality of drugs employed in dispensing National Health Insurance prescriptions was called for by the annual general meeting of the National Drug and Chemical Union in London this week. Protest was also made against the wages and conditions offered for pharmacists and industrial chemists.

THE ANNUAL MEETING of the Bristol Section of the Society of Chemical Industry was held last week. Mr. G. Gray was re-elected chairman and Professor E. F. Francis vice-chairman. Dr. T. H. Butler, Mr. E. Lewis and Mr. C. J. Waterfall were re-elected to the committee. The membership was steady and accounts were satisfactory.

BRYANT AND MAY (BRAZIL), LTD., will acquire all or part of the share capital of the Companhia Fiat Lux Match Manufacturers, Brazil. An agreement has been entered into with Bryant and May, Ltd., and Davidson, Unwin and Co., of London, and Davidson, Pullen and Co., of Rio de Janeiro, holders of shares of the said company. The nominal capital of the new company is £600,000 in £1 shares.

THE CHEMICAL ENGINEERING group of the S.C.I. will hold a joint meeting with the Institution of Chemical Engineers on April 14 at Burlington House, W., when a paper on "The Beet Sugar Industry" will be read by Mr. J. Kwantes, technical adviser to the Cantley and Kelham Beet Sugar Factories. A visit to the Kelham factory has been arranged for April 16. Sir F. Nathan will take the chair at the meeting at 8 p.m.

AN EXHIBITION OF FIRE-FIGHTING APPLIANCES will be held at Lodz on May 15. The Commercial Secretary suggests that British firms should be represented, as both local and German firms are exhibiting. Space will be free, and there will be no duty on the exhibits unless eventually sold. It is suggested that at least literature and photographs should be sent by British makers, and these and other communications should be addressed to Dr. A. Grohman, Tylna 14, Lodz.

IN A REPORT to the members of the Sewage Committee of Glasgow Corporation on the present position of the sewage purification problem at the Dalmarnock Works, Mr. F. W. Harris, Corporation chemist, states that the change in the strength and character of the sewage is traceable to alteration in the composition of the spent ammoniacal liquor from gasworks, following the introduction of vertical retorts. It was remitted to a special sub-committee to confer with the Gas sub-committee on by-products on the question.

UNIVERSITY INTELLIGENCE includes the following announcements:—*Oxford:* Exeter College, to an open Scholarship in Chemistry, R. Profitt, Devonport High School; to a Stapeldon Scholarship, open *pro hac vice* for Chemistry, W. W. Gilford, Reading School. *Leicester:* University College, Mr. H. P. Gee has given a further £4,000 to the Chemistry and Physics Department Fund. *London:* The Imperial College of Science and Technology has appointed Mr. F. B. Browne to the Professorship of Entomology in succession to the late Professor Maxwell-Lefroy. An assistant professor is also to be appointed.

A SPANISH ROYAL ORDER prohibits the use in Spain in the interior painting of buildings, as from November 1, 1928, of white lead, sulphate of lead and products containing these pigments. Certain exceptions will be laid down later. The prohibition does not extend to white pigments containing not more than 2 per cent. of metallic lead. The Decree also provides that, as from the date of its promulgation, white lead, sulphate of lead and products containing these pigments may only be manipulated in the form of paste or of paint prepared for use. Receptacles containing white lead, sulphate of lead or paints with a lead base must be labelled with the equivalent of "Containing lead—poisonous."

THE POSTPONEMENT is announced of the meeting of the Oil and Colour Chemists' Association fixed for April 8. It will be held on April 22.

MR. HUGH LUPTON, managing director of Hathorn, Davey and Co., Ltd., pumping machine manufacturers, will be the new Lord Mayor of Leeds.

A SERIOUS CASE OF POISONING following the inhalation of fumes given off by liquid oxygen is reported from Lochaber water power works. Several men were affected and this is the second case of gassing from this cause.

A SULPHITE MILL is to be erected by the International Paper Co. of New York, under agreement with the Government. The company is acquiring a large forest area on the north-east coast of Newfoundland for the purpose.

FOR THE FIRST TIME SINCE 1920 the Bureau of Employment at the U.S. Chemists' Club, New York, reports more requests for engineers and chemists—particularly for junior positions—than can be filled from its present lists of those seeking employment.

THE MANUFACTURE OF INDUSTRIAL ALCOHOL is to be started at Norfolk, Virginia. The construction and operation of a plant by the Barron-Lesner Industrial Alcohol Co. is authorised by recent legislation, which also provides for the construction of a $1,000,000 industrial unit in Norfolk by the Old Dominion Distillers' Corporation.

RECENT WILLS include—Major-General F. J. Caldecott, London, for many years superintendent of the Indian Government Gunpowder and Experimental Explosives Factory at Kerkie, £10,615. —Mr. W. Hampson, London, a leading member of the Council of the Rontgen Society and inventor of several X-ray appliances, £5,574.

THE CASE in which the Anglo-Celtic Shipping Co., Ltd., of Cardiff, sued Thompson and Co., of Liverpool, manufacturers of a cleaning preparation named "Pluperfect," in respect of an explosion in the engine room of the plaintiff's ship, again came before Mr. Justice Roche in the King's Bench Division on Monday. His Lordship entered judgment for plaintiffs for £1,850 and costs.

MR. LAMOTT DU PONT has succeeded his brother, Mr. I. du Pont, as president and chairman of the executive committee of the E. I. du Pont de Nemours & Co. He is the eighth member of the du Pont family to become head of the organisation since its formation in 1802, and the third brother in succession to become president. The new head is in his forty-sixth year and has spent all his business career with the company.

THE EXHIBITION of the Czechoslovak Chemical Society will be held at Prague between May 14 and 16 in the laboratories of the Chemical Institute of the Czech Technical High School. The exhibition will be visited by all the important Czechoslovak interests and therefore offers a good opportunity for British manufacturers to exhibit their goods, which may be imported free of duty. All details can be obtained from the Department of Overseas Trade (Reference B.2437).

THE SERIOUS EFFECT of the non-existence of the Associated China Clays organisation on the trade generally was reported at the annual meeting of English China Clays, Ltd., held in London on Tuesday. The board would naturally support efforts now being made to form a new organisation. The volume of trade had been satisfactory, approximating very nearly to pre-war figures and in the case of the company, to within a few tons of the 1920 boom year. America was the best customer. The home market had been good for both filling and coating clays for paper making, but the pottery and cotton trades had shown scarcely any signs of activity.

MR. A. RODGER, President of the Forest Research Institute and College at Dehra Dun, is to succeed Sir Peter Clutterbuck, who is to retire, as Inspector-General of Forests, and will combine his new duties with the Presidential duties already in his charge. The Inspector-General will now be relieved of considerable secretarial work, while the other side of the combined office will gain relief by the creation of a new appointment of Professor of Forestry at the Research Institute and College, and of a Vice-President of both. Mr. Rodger will thus have freedom to tour and will make the settlement at Dehra Dun, including the great School of Tropical Forestry which is about to be opened there, one province, as it were, under his command.

Obituary

MR. ERIC HESS, aged 35, at Harrogate, son of the late Dr. Adolf Hess and a director of A. Hess and Brothers, Ltd., oil distillers, Leeds.

MR. GEORGE S. CORLETT, formerly president of the Association of Mining Electrical Engineers, and a pioneer in electrical engineering for mining, at Wigan, aged 59.

MR. CHARLES HARRISON, aged 59, head of the Oils and Colours Department at the Borough Polytechnic Institute for 26 years. He was a prominent member of the Paint and Varnish Society and did much research work. In 1902 he joined Mr. Charles Orme in partnership as paint, etc., manufacturers. This partnership was dissolved and in 1921 a private limited company was formed—Charles Orme and Co., Ltd.—being conducted by Mr. Harrison and his sons. The latter will continue the business.

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Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each

Abstracts of Complete Specifications

247,787. DYES AND DYEING. J. Morton, Longlands, Lancaster, J. I. M. Jones, 39, Westbourne Road, Lancaster, B. Wylam, Carr House, Regent Street, Lancaster, J. E. G. Harris, Murrell Hill House, Carlisle, J. Wilson, 84, Nelson Street, Carlisle, and Morton Sundour Fabrics, Ltd., Carlisle. Application dates, August 11, September 8, October 16, 1924, and June 11, 1925.

The process is for the production of derivatives of vat dyestuffs in which the dyestuff in suspension or solution in a suitable organic base in the presence of a metal is treated with an alkyl sulphuric acid halide. The dry vat dyestuff may be suspended with a suitable metallic powder in an organic tertiary base, and heated in a vessel having a reflux condenser. The product is cooled and treated with an alkyl sulphuric acid chloride, or the process may be effected in a single operation. The metal may be zinc powder, the medium may be pyridine, and the alkyl sulphuric acid halide may be methyl sulphuric acid chloride. The dyeing compound is extracted from the product with water. Acids or acid reacting salts may be added to the reaction mixture, *e.g.*, hydrochloric or acetic acid, zinc chloride, or sodium bisulphite. The process may be applied to flavanthrone, the metal being copper bronze, and the temperature being about 80° C.

248,070. BASE EXCHANGE MATERIALS AND PROCESS OF MAKING THE SAME. H. J. C. Forrester, London. From International Filter Co., 333, West 25th Place, Chicago, Illinois, U.S.A. Application date, November 26, 1924.

The process is for the synthetic production of hydrated base exchange double silicates from solutions of alkali metal silicates and salts of amphoteric metals, *e.g.*, aluminium sulphate. The silicate and metal salt solutions are mixed in such proportions and at such a temperature as to form a non-acid gel. The gel is dried without washing or other treatment, so that the product contains all the constituents of the mixture, and is then washed to remove soluble constituents. The temperature is preferably about 5° C., and the drying temperature not above 100° C. An example is given of the production of gel from aluminium sulphate and water glass. The gel occupies the entire volume of the reacting liquids before drying, and the final product is a hard and highly porous material with a very high base-exchange capacity.

248,079. ROTARY KILNS FOR BURNING CEMENT, ORE AND SIMILAR MATERIALS. Vickers, Ltd., Vickers House, Broadway, Westminster, London, and L. D. Parker, of Vickers, Ltd., Barrow-in-Furness, Lancs. Application date, November 27, 1924.

This kiln is of the kind which is provided near the discharge end with a heat recuperator in the form of a double shell through which the residual material passes in one direction

Fig 1.

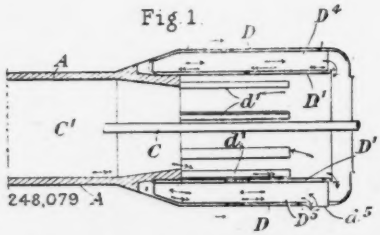
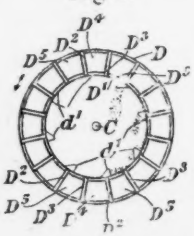


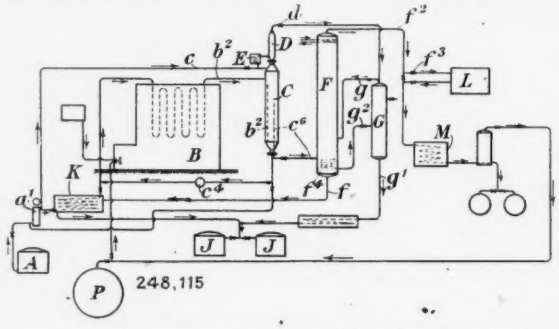
Fig 3.



and the air in the other direction. The kiln A is provided with a pipe C which introduces the combustible material, the burning zone being at C^1. The recuperator is provided with outer and inner walls D, D^1, enclosing an annular space which is provided with longitudinal plates D^2, D^3. Alternate plates are made shorter to provide a series of pairs of compartments D^4, D^5, which communicate at one end. The compartments D^4 are open at one end to receive the clinker, and the compartments D^5 are provided with openings d^5 through which the clinker passes out and air enters. The inner shell D^1 has lifting plates d^1, and the compartments D^4, D^5 may have helical or inclined plates to produce the necessary travel of the clinker.

248,115. CRACKING OF LIQUID HYDROCARBONS. V. L. Oil Processes, Ltd., O. D. Lucas, and E. L. Lomax, Vickers House, Broadway, Westminster, London. Application date, December 9, 1924.

Oil from the tank A is forced by a pump a^1 through a heat exchanger K and thence through a pipe still B heated by gas from a holder P. The heated oil passes through a pipe b^2 to a cracking chamber C, which is lagged but not separately heated. When the oil in this chamber reaches the necessary



temperature, the process can be carried on by pumping fresh oil into the top of the chamber through a pipe *c* so that it drops into the heated oil. In the latter case, the necessary heat for the cracking is obtained by circulating the oil through the still B by a pump c^4. Vapour passes through a refluxing chamber D and relief valve *d* to an expansion chamber G at a relatively low temperature. This chamber is connected by a pipe *g* to a dephlegmator F. The condensate from the chamber D passes through a cooler E back to the chamber C. The condensates from the chamber G and column F pass through pipes *f*, g^1 to the fuel oil receivers J, the hot oil from the column passing first through the heat exchanger K. Gas and light oils are drawn from the top of the column F through a pipe f^2 and valve f^3 to a refining plant L and main condenser M. The gases at a pressure of about 50 lb. per square inch pass to the holder P. Oil from the chamber C passes through a pipe c^6 to a coil f^4 in the bottom of the column F, then through a valve g^2 to the expansion chamber G. The chamber C is at a temperature of about 450°–550° C. and pressure of 600–1,000 lb. to a square inch, and the fresh oil is heated to 500°–600° C. in the still B. The reflux chamber D is heated to 360°–400° C.; and the chamber G is at about 350° C., the pressure being 75 lb. per square inch.

248,182. ACRIDINE DERIVATIVES, MANUFACTURE OF. British Dyestuffs Corporation, Ltd., 70, Spring Gardens, Manchester, W. H. Perkin, South Parks Road, Oxford, and A. W. Burger, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, March 12, 1925.

Amino methoxy or ethoxy acridine derivatives are obtained by fusing 2:4-diamino-anisol or 2:4-diamino-phenetol with zinc chloride, oxalic acid or formic acid, and glycerine. The acridine is extracted from the product by boiling with water and converted into the acridinium salt by acetylation alkylation, and subsequent hydrolysis. Other derivatives are obtained by condensing *o*-nitro-anisol or *o*-nitro-phenetol with formaldehyde and reducing the condensation product. The 3:3′-diamino-4:4′-dimethoxy- or diethoxy-diphenyl-methane obtained is acetylated and nitrated, then hydrolysed and reduced, and the reduction mixture heated to form the acridine. The products have good bactericidal properties and are soluble.

(*Continued on p* 335)

(*Continued from p.* 334)

248,186. Fractional Distillation of Hydrocarbons, Process for. C. de Ganahl and F. C. Koch, Grain Halt, Isle of Grain, Kent. Application date, March 16, 1925.

This process is for the fractional distillation of petroleum or products obtained from the destructive distillation of coal such as benzol, xylene, etc. It enables a highly efficient separation of the fractions to be obtained so that the final boiling point of one fraction is lower than the initial boiling point of the next. The apparatus provides a volume and heat accumulator comprising a pair of vessels, one serving as a receptacle for back trap oil from a dephlegmator tower. The oil is caused to flow from this vessel to the second vessel, when the volatile part is removed so that the cooler lighter back trap oil is prevented from being mixed with the residuum until its volatile fraction is removed.

248,214. Iron Perchloride, Manufacture of. D. Tyrer, Stoneleigh, West Villas, Stockton-on-Tees, Durham. Application date, May 6, 1925.

The tendency of ferric chloride to decompose when heated to obtain the solid salt is avoided in this process by treating solid ferrous chloride with chlorine gas. The heat of the reaction liquefies the crystals and sufficient water is then added to produce the product $FeCl_3.6H_2O$. The solution solidifies on cooling and when broken up is in the usual form of ferric chloride.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention :—232,251 (Soc. of Chemical Industry in Basle), relating to manufacture of azo dyestuffs, see Vol. XII, p. 617 ; 232,618 (P. Pipereaut and A. Helbronner), relating to pigments containing zinc oxide, see Vol. XII, p. 642 ; 235,589 (British Thomson-Houston Co., Ltd.), relating to preparation of resinous condensation products, see Vol XIII, p. 176 ; 239,814 (C. Ab-der-Halden), relating to continuous distillation of tar, etc., see Vol. XIII, p. 529.

International Specifications not yet Accepted

246,476. Cellulose Derivatives and Conversion Products. S. A. Ogden, 263, Kenilworth Avenue, Eagle Rock, Los Angeles, Cal., U.S.A. International Convention date, January 20, 1925.

An irreversible colloidal cellulose is obtained by treatment up to 70° C. with sulphuric acid of 40-55° Bé. The acid is washed out, and the product dried to a horny mass. It may be used as a binder for clay, paper, asbestos, and rubber, and as a substitute for cellulose xanthates.

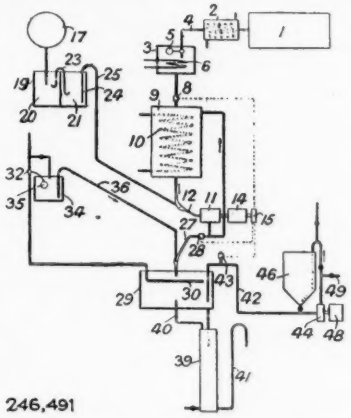
246,482. Naphthoquinone Derivatives. Soc. Anon. des Matières Colorantes et Produits Chimiques de St. Denis, 105, Rue La Fayette, Paris, R. Lantz, 226, Rue La Fayette, Paris, and A. Wahl, 14 bis, Boulevard Cotte, Enghien, Seine-et-Oise, France. International Convention date, January 21, 1925.

1-imino-2-oxy-4-arylimino-naphthoquinones are obtained by simultaneously oxidising 1 : 2-aminonaphthol or 1 : 2-aminonaphthol-4-sulphonic acid and a primary aromatic amine, or by the action of 1 : 2-nitrosonaphthol on an aromatic amine. Three methods are described for obtaining the 4-phenylimino compound: (1) by agitating a mixture of aminonaphthol and aniline in contact with air in presence of sodium bicarbonate, (2) by oxidising a mixture of 1 : 2 : 4-aminonaphthol-sulphonic acid and aniline in sodium bicarbonate solution with sodium hypochlorite, ammonium persulphate or iodine, (3) by boiling nitroso-β-naphthol with aniline and benzene. The second method may be employed with air as the oxidising agent, and the aniline may be replaced by *p*-toluidine, *o*-toluidine, *o*-anisidine, *p*-chloraniline, or *p*-phenylene-diamine.

2-oxy-1 : 4-diarylimino-naphthoquinones are obtained by simultaneously oxidising a 1-arylamino-2-oxynaphthalene-4-sulphonic acid and a primary aromatic amine. Examples are given of the use of various sulphonic acids and amines. These products are also obtained by treating the 1-imino-2-oxy-4-arylimino-naphthoquinones first described with primary aromatic amines. The 1-imino-2-oxy-4-arylimino-naphthoquinones can also be hydrolysed to obtain 2-oxy-4-arylimino-1-naphthoquinones.

246,491. Synthetic Resins. Barrett Co., 40, Rector Street, New York. Assignees of S. P. Miller, 6820, Verbena Avenue, Philadelphia, U.S.A. International Convention date, January 23, 1925.

The apparatus is for polymerising oils such as naphtha. The oil passes from a tank 1 through coolers 2, 3, and then



through a valve 8 controlled by a timing device 15 to the polymeriser 9. A pump 11 is driven by a motor 14 controlled by the device 15, and circulates the oil through the polymeriser. A polymerising agent such as sulphuric acid passes in definite quantities from a tank 17 through compartments 20, 21, under the control of a siphon consisting of a small pipe 24 joining a larger pipe 25 connected to the outlet of the polymeriser. Circulation of the oil is continued for the required time, and the timing device then opens valve 28 to discharge the product to a washer 29. Water is simultaneously drawn from tank 34 through a pipe 36, and the lowering of the level permits a float valve 32, 35 to admit water to a sprayer 30. Acid and water are drawn off in a settling tank 39, and the polymerised product returns through a pipe 40 to the washing tank. The timing device then closes a vent 43 and the oil passes to a vessel 46 containing caustic soda, and finally to an outlet 49. A fresh quantity of oil is automatically admitted to the polymeriser.

246,498. Barium Sulphate. K. Ebers, 74, Manhagener Allee, Ahrensburg, Holstein, Germany. International Convention date, January 22, 1925.

To obtain barium sulphate, heavy spar containing limestone, iron, manganese, etc., is burned in the same manner as limestone and then treated with water. Barium sulphate is separated by sedimentation and decantation, and purified by treating with hydrochloric acid.

246,501. Iodo-pyridine Compounds. Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler, 7, Weissfrauenstrasse, Frankfurt-on-Main, Germany. International Convention date, January 24, 1925.

Tautomeric pyridine derivatives containing amino or hydroxy groups are treated with iodine in weak alkaline solution, in the presence of a substance which combines with hydriodic acid. In an example iodine is added to a paste of potassium carbonate with molten 2-aminopyridine, and more potassium carbonate then added ; 2-amino-5-iodopyridine separates on diluting with water ; 2-oxy-4-iodo-5-nitropyridine and diiodo-oxypyridine are also described.

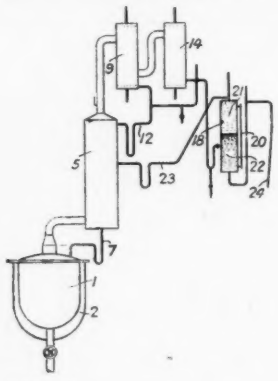
246,512. Aluminium Salts. O. Lederer and W. Stanczak, 5, Palacky St., Karlin, Prague. International Convention date, January 24, 1925.

Clay is heated with sodium carbonate solution in an autoclave under pressure, and the products then strongly cooled while under pressure. The sodium carbonate is unchanged, but the alumina is now readily soluble in sulphuric acid, leaving a residue of silica.

246,526. Esters. U.S. Industrial Alcohol Co., 110, East 42nd Street, New York. Assignees of F. B. Arentz, 2404, Elsinor Avenue, Baltimore, U.S.A. International Convention date, January 26, 1925.

The process is for the preparation of normal butyl acetate, isobutyl acetate, amyl acetate, normal butyl tartrate, amyl

phthalate, butyl phthalate, amyl formate, etc. Butyl alcohol and concentrated or glacial acetic acid, with a small proportion of sulphuric acid, are heated in a still 1 having a heating jacket 2. The vapour passes to a column 5 and dephlegmator 9, the condensates returning to the still through pipes 7, 12. When a substantial amount of ester is formed, the



246,526

mixture is distilled, and the condensate collected in a condenser 14, from which it passes to a vessel 18, where it separates into two layers. The upper layer is mainly butyl acetate and butyl alcohol, and is returned by a pipe 23 to the column 5, and the lower layer is mainly water which is drawn off. When water ceases to separate out, caustic soda is added to the mixture in the still, which mixture is rectified to recover the ester.

LATEST NOTIFICATIONS.

249,465. Process for purifying plumbiferous chloride liquors. Consortium für Nassmetallurgie. March 20, 1925.

249,474. Process for producing chlorine and sulphate from alkali chlorides. Zellstoffabrik Waldhof, and Schmidt, E. March 21, 1925.

249,489. Manufacture of intermediate products of the anthraquinone and anthracene series, and dyestuffs therefrom. Society of Chemical Industry in Basle. March 18, 1925.

249,493. Manufacture and production of organic compounds from natural oils and other bitumens. I. G. Farbenindustrie Akt.-Ges. March 19, 1925.

249,497. Manufacture of quinolic anhydride. Soc. of Chemical Industry in Basle. March 19, 1925.

249,501. Manufacture and production of organic compounds from natural oil or other bitumens, and products obtained therefrom. I. G. Farbenindustrie Akt.-Ges. March 19, 1925.

249,510. Process for the manufacture of mixtures of alkali hypochlorite and alkali chloride in solid form. Oppe, A. March 23, 1925.

249,515. Process for the manufacture of organo-metallic combinations of sulpharsenol. Wyld, F. Lehnhoff-. March 17, 1925.

249,519. Method for treating fuels for the obtainment of by-products. Patart, G. March 21, 1925.

249,526. Production or development of azo dyes. Bucherer, H. T. March 17, 1925.

249,549. Manufacture of dyestuff preparations. Soc. of Chemical Industry in Basle. March 20, 1925.

249,550. Method of separating constituents from a mixture. I. G. Farbenindustrie Akt.-Ges. March 18, 1925.

249,555. Process for the production of moulded silicic acid gel. Pratorius, Dr. M. and Wolf, Dr. K. March 21, 1925.

Specifications Accepted with Date of Application

227,843. Evaporation and concentration of solutions of substances. C. Collard. January 14, 1924.

234,772. Complex gold compounds, Manufacture of. Farbwerke vorm. Meister, Lucius, and Brüning. June 2, 1924. Addition to 225,875.

240,401. Lead compounds from ores, metallurgical products, waste products from chemical processes, etc., Process for the production of. Consortium fur Nassmetallurgie. September 23, 1924.

242,583. Extraction of hydrogen contained in industrial gases and chiefly in coke oven gas, Process of and apparatus for. Ammonia. November 6, 1924.

248,802. Dyes and dyeing. J. I. M. Jones, B. Wylam, J. Morton, and Morton Sundour Fabrics, Ltd. July 25, 1924.

248,811. Soluble vat dyestuff preparations, Manufacture of. W. Carpmael. (*Farbenfabriken vorm. F. Bayer and Co.*) November 8, 1924.

248,828. Distilling fatty acids and other volatile substances from oils and fats, acid oils, and crude fatty acids, Process for. J. J. V. Armstrong. (*Naamlooze Vennootschap A. Jurgens' Margarinefabrieken.*) December 10, 1924.

248,858. Anthraquinone dyestuffs possessing affinity for acetyl silk, Manufacture of. British Dyestuffs Corporation, Ltd., W. H. Perkin, and C. Hollins. December 16, 1924.

248,864. Recovery of soda from its solution, and apparatus therefor. W. M. Wallace. December 18, 1924. Addition to 217,468.

248,866. Aminodianthrimides, Process for the preparation of. British Dyestuffs Corporation, Ltd., H. M. Bunbury, and R. Robinson. December 19, 1924.

248,874. Anthraquinone derivatives, Manufacture and production of. H. Dodd, W. C. Sprent, and United Alkali Co., Ltd. December 29, 1924.

248,946. Azo dyestuffs and intermediate products therefor, Manufacture of. A. G. Bloxam. (*Chemische Fabrik Griesheim Elektron.*) April 15, 1925.

248,975. Arsenic preparations, Manufacture and production of. J. Y. Johnson. (*Badische Anilin and Soda Fabrik.*) June 10, 1925.

248,999. Heat-interchangers and apparatus and processes for carrying out catalytic gas reactions. Synthetic Ammonia and Nitrates, Ltd., and F. H. Bramwell. July 22, 1925.

249,039. Methylals, Manufacture of. H. Wade. (*S. Karpen and Bros.*) October 23, 1925.

249,041. Pure urea, Manufacture and production of. J. Y. Johnson. (*Badische Anilin and Soda Fabrik.*) November 5, 1925.

249,044. Continuous separation of sulphur from sulphur solutions, Process for. E. Legeler. July 6, 1925.

Applications for Patents

American Magnesium Corporation and White, A. E. Refining calcium and magnesium. 8,100. March 24.

Anderson, L. J., Cash, W. A. and Stephens, F. G. C. Production of titanium-containing pigments. 8,317. March 26.

Benelli, T. and Bombrini Parodi-Delfino. Manufacture of explosives. 8,086. March 24.

British Dyestuffs Corporation, Ltd. Method of dyeing furs. 8,094. March 24.

British Dyestuffs Corporation, Ltd. and Lumsden, C. H. Manufacture of anthraquinone derivatives. 8,176. March 25.

British Dyestuffs Corporation, Ltd. and Shepherdson, A. Manufacture of anthraquinone derivatives. 8,397. March 27.

Calico Printers' Association, Ltd., Levin, C. and Whinfield, J. R. Production of printed and dyed effects on artificial silk, etc. 8,281. March 26.

Dreyfus, H. Manufacture of cellulose derivatives, etc. 8,275, 8,276. March 26.

Gray Processes Corporation. Treatment of hydrocarbons. 8,099. March 24. (United States, March 24, 1925.)

Hall, A. J. and Silver Springs Bleaching and Dyeing Co., Ltd. Dyeing, mercerising, etc., textiles. 8,041. March 24.

I. G. Farbenindustrie Akt.-Ges. Manufacture of aralkylamines, etc. 8,311. March 26. (Germany, March 30, 1925.)

Marks, E. C. R. and Max Ams Chemical Engineering Corporation. Washing or dyeing apparatus. 8,190. March 25.

Meyerhofer, A. F. Process of decomposing salts of complex hydrofluoric acids. 7,966. March 23. (Germany, March 24, 1925.)

Moro, S. Manufacture of xanthate of cellulose. 8,061. March 24. (France, March 31, 1925.)

Petroleum Chemical Corporation. Preparation of petroleum derivatives. 8,101. March 24.

Soc. of Chemical Industry in Basle. Manufacture of azo-dyestuffs. 8,312. March 26. (Switzerland, March 28, 1925.)

Stalhane, O. Manufacture of cyanic combinations. 7,978. March 23.

Toniolo, C. Manufacture of nitric acid. 8,381. March 27.

Wickham, P. E. Decolorising china clay, etc. 8,009. March 23.

Wolffenstein, R. Nitro derivatives of terpene alcohols. 8,046. March 24.

U.S. Dye Imports Increase in 1925

THE official figures of the U.S. imports of coal tar, chemicals and colour lakes for 1925 are now available. Details are as follows:—Synthetic aromatic chemicals, 1925, 127,774 lb., value $253,624; 1924, 73,063 lb., value $199,658. Medicinals, photographic developers, intermediates and other coal-tar chemicals, 1925, 1,881,520 lb., value $613,519; 1924, 2,119,525 lb., value $406,066. Colour lakes, 1925, 71,161 lb., value $29,567; 1924, 34,402 lb., value $16,769. It is interesting to note that the import figures for coal tar dyes for 1925 were 5,112,636 lb., value $4,644,822. In 1920 the comparative figures were 3,402,582 lb., value $5,763,437; and in 1914, 45,950,895 lb., value $9,502,714.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID BORIC, COMMERCIAL.—Crystal, £37 per ton, Powder, £39 per ton.

ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength, and locality.

ACID NITRIC, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.

BISULPHITE OF LIME.—£7 10s. per ton, packages extra, returnable.

BLEACHING POWDER.—Spot, £9 10s. d/d; Contract, £8 10s. d/d, 4-ton lots.

BORAX, COMMERCIAL.—Crystal, £23 per ton. Powder, £24 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

CALCIUM CHLORATE (SOLID).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carr. paid.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 64 O.P.—Industrial, 2s. 5d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE.—4½d. per lb.

POTASSIUM CHLORATE.—3½d. per lb., ex wharf, London, in cwt. kegs.

SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.

SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

SODA CRYSTALS.—£5 to £5 5s. per ton ex railway depots or ports.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.

SODIUM BICHROMATE.—3½d. per lb.

SODIUM BISULPHITE POWDER 60/62%.—£17 per ton for home market, 1-cwt. iron drums included.

SODIUM CHLORATE.—3d. per lb.

SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.

SODIUM PHOSPHATE.—£14 per ton, f.o.r. London, casks free.

SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.

SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.

SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.

SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—4¾d. to 5d. per lb. Crude 60's, 1s. 4½d. to 1s. 6d.

ACID CRESYLIC 97/99.—1s. 6½d. to 1s. 9d. per gall. Pale, 95%, 1s. 5d. to 1s. 7d. per gall. Dark, 1s. 3½d. to 1s. 5d. per gall. Steady.

ANTHRACENE.—A quality, 3d. to 4d. per unit.

ANTHRACENE OIL, STRAINED.—7d. to 8d. per gall. Unstrained, 6½d. to 7½d. per gall.

BENZOL.—Crude 65's, 1s. 2½d. to 1s. 3½d. per gall., ex works in tank wagons. Standard Motor, 1s. 9d. to 1s. 11d. per gall., ex works in tank wagons. Pure, 1s. 10d. to 2s. 2d. per gall., ex works in tank wagons.

TOLUOL.—90%, 1s. 9½d. to 2s. per gall. Pure, 2s. to 2s. 2d. per gall.

XYLOL.—2s. to 2s. 6d. per gall. Pure, 3s. 3d. per gall.

CREOSOTE.—Cresylic, 20/24%, 9d. to 10d. per gall. Standard specification, middle oil, heavy, 6½d. to 7d. per gall.

NAPHTHA.—Crude, 9d. to 1s. per gall. Solvent 90/160, 1s. 5d. to 1s. 10d. per gall. Steady demand. Solvent 90/190, 1s. to 1s. 4d. per gall.

NAPHTHALENE CRUDE.—Drained Creosote Salts, £3 10s. to £5 10s. per ton. Whizzed or hot pressed, £5 10s. to £7 10s.

NAPHTHALENE.—Crystals and Flaked, £11 10s. to £13 per ton, according to districts.

PITCH.—Medium soft, 85s. to 87s. 6d. per ton, according to district. Market active.

PYRIDINE.—90/140, 19s. 6d. to 21s. per gall. Firmer. Heavy, 7s. to 10s. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—7s. per lb. 100%.

ACID BENZOIC.—1s. 9d. per lb.

ACID GAMMA.—8s. per lb.

ACID H.—3s. 3d. per lb. 100% basis d/d.

ACID NAPHTHIONIC.—2s. 2d. per lb. 100% basis d/d.

ACID NEVILLE AND WINTHER.—4s. 9d. per lb. 100% basis d/d.

ACID SULPHANILIC.—9d. per lb. 100% basis d/d.

ANILINE OIL.—7d. per lb. naked at works.

ANILINE SALTS.—7d. to 7½d. per lb. naked at works.

BENZALDEHYDE.—2s. 1d. per lb. Fair home inquiry.

BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.

o-CRESOL 29/31° C.—3d. per lb. Demand quiet.

m-CRESOL 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

p-CRESOL 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

DICHLORANILINE.—2s. 3d. per lb.

DIMETHYLANILINE.—1s. 11d. to 2s. per lb. d/d. Drums extra.

DINITROBENZENE.—9d. per lb. naked at works.

DINITROCHLORBENZENE.—£84 per ton d/d.

DINITROTOLUENE.—48/50° C. 8d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.

DIPHENYLANILINE.—2s. 10d. per lb. d/d.

a-NAPHTHOL.—2s. per lb. d/d. Fair home inquiry.

B-NAPHTHOL.—11d. to 1s. per lb. d/d. Fair home inquiry.

a-NAPHTHYLAMINE.—1s. 3d. per lb. d/d. Fair home inquiry.

B-NAPHTHYLAMINE.—3s. 2d. per lb. d/d. Fair home inquiry.

o-NITRANILINE.—5s. 9d. per lb.

m-NITRANILINE.—3s. 6d. per lb. d/d.

p-NITRANILINE.—1s. 9d. per lb. d/d. Fair home inquiry.

NITROBENZENE.—5d. to 5½d. per lb. naked at works. Fair home inquiry.

NITRONAPHTHALENE.—10d. per lb. d/d.

R. SALT.—2s. 4d. per lb. 100% basis d/d.

SODIUM NAPHTHIONATE.—1s. 9d. per lb. 100% basis d/d.

o-TOLUIDINE.—8d. per lb. naked at works.

p-TOLUIDINE.—2s. 2d. per lb. naked at works.

m-XYLIDINE ACETATE.—2s. 11d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 15s. to £9. Firmer. Grey, £17 10s. per ton. Better inquiry. Liquor, 9d. per gall. 32° Tw.

ACETONE.—£81 per ton.

CHARCOAL.—£7 5s. to £9 per ton, according to grade and locality. Demand good.

IRON LIQUOR.—1s. 6d. per gall. 32° Tw. 1s. 2d. per gall., 24° Tw.

RED LIQUOR.—9½d. to 1s. per gall.

WOOD CREOSOTE.—2s. 9d. per gall. Unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 10d. per gall. 60% O.P. Solvent, 4s. 6d. per gall. 40% O.P. Very quiet.

WOOD TAR.—£3 to £5 per ton, according to grade.

BROWN SUGAR OF LEAD.—£40 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 5d. per lb., according to quality, Crimson, 1s. 3d. to 1s. 7½d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—2s. per lb.

BARYTES.—£3 10s. to £6 15s. per ton, according to quality.

CADMIUM SULPHIDE.—2s. 9d. per lb.

CARBON BISULPHIDE.—£20 to £25 per ton, according to quantity.

CARBON BLACK.—5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£46 to £55 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 9d. per lb.

INDIARUBBER SUBSTITUTES, WHITE AND DARK.—5½d. to 6½d. per lb.

LAMP BLACK.—£35 per ton, barrels free.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE, 30%.—£22 10s. per ton.

MINERAL RUBBER "RUBPRON."—£13 12s. 6d. per ton f.o.r. London.

SULPHUR.—£9 to £11 per ton, according to quality.

SULPHUR CHLORIDE.—4d. per lb., carboys extra.

SULPHUR PRECIP. B.P.—£47 10s. to £50 per ton.

THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb. carriage paid.

THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.

VERMILION, PALE OR DEEP.—5s. 3d. per lb.

ZINC SULPHIDE.—1s. 1d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, 80% B.P.—£38 10s. to £39 per ton ex wharf London in glass containers.

ACID, ACETYL SALICYLIC.—2s. 4d. to 2s. 6d. per lb. Keen competition met. Good demand.

ACID, BENZOIC B.P.—2s. to 2s. 3d. per lb., according to quantity.

ACID, BORIC B.P.—Crystal, £43 per ton; Powder, £47 per ton. Carriage paid any station in Great Britain, in ton lots.

ACID, CAMPHORIC.—19s. to 21s. per lb.

ACID, CITRIC.—1s. 4d. to 1s. 4½d. per lb., less 5%.

ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.

ACID, PYROGALLIC, CRYSTALS.—6s. 7d. per lb. Resublimed, 7s. 3d.

ACID, SALICYLIC.—1s. 3½d. to 1s. 5d. per lb. Technical.—10½d. to 10¾d. per lb.

ACID, TANNIC B.P.—2s. 10d. per lb.

ACID, TARTARIC.—1s. 0½d. per lb., less 5%. Market firm.

AMIDOL.—6s. 6d. per lb., d/d.

ACETANILIDE.—1s. 7d. to 1s. 8d. per lb. for quantities.

AMIDOPYRIN.—12s. 6d. per lb.

AMMONIUM BENZOATE.—3s. 3d. to 3s. 6d. per lb., according to quantity.

AMMONIUM CARBONATE B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.

ATROPINE SULPHATE.—11s. per oz. for English make.

BARBITONE.—10s. per lb.

BENZONAPHTHOL.—3s. 3d. per lb. spot.

BISMUTH CARBONATE.—12s. 6d. to 14s. 3d. per lb.

BISMUTH CITRATE.—9s. 6d. to 11s. 3d. per lb.

BISMUTH SALICYLATE.—10s. 3d. to 12s. per lb.

BISMUTH SUBNITRATE.—10s. 9d. to 12s. 6d. per lb. according to quantity.

BORAX B.P.—Crystal, £27; Powder, £28 per ton. Carriage paid any station in Great Britain, in ton lots.

BROMIDES.—Potassium, 1s. 9d. to 1s. 11d. per lb.; sodium, 1s. 10d. to 2s. 2d. per lb.; ammonium, 2s. 3d. to 2s. 5d. per lb., all spot.

CALCIUM LACTATE.—1s. 3d. to 1s. 5d.

CHLORAL HYDRATE.—3s. 3d. to 3s. 6d. per lb., duty paid.

CHLOROFORM.—2s. 3d. to 2s. 7½d. per lb., according to quantity.

CREOSOTE CARBONATE.—6s. per lb.

FORMALDEHYDE.—£40 per ton, in barrels ex wharf.

GUAIACOL CARBONATE.—7s. 6d. per lb.

HEXAMINE.—2s. 4d. to 2s. 6d. per lb.

HOMATROPINE HYDROBROMIDE.—30s. per oz.

HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.

HYDROGEN PEROXIDE (12 VOLS.).—1s. 8d. per gallon f.o.r. makers' works, naked.

HYDROQUINONE.—4s. 3d. per lb., in cwt. lots.

HYPOPHOSPHITES.—Calcium, 3s. 6d. per lb., for 28-lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.

IRON AMMONIUM CITRATE B.P.—2s. to 2s. 3d. per lb. Green, 2s. 4d. to 2s. 9d. per lb. U.S.P., 2s. 1d. to 2s. 4d. per lb.

MAGNESIUM CARBONATE.—Light Commercial, £31 per ton net.

MAGNESIUM OXIDE.—Light Commercial, £67 10s. per ton, less 2½%, price reduced; Heavy Commercial, £23 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.

MENTHOL.—A.B.R. recrystallised B.P., 21s. 6d. net per lb., Synthetic, 15s. to 19s. 6d. per lb., according to quality. English make.

MERCURIALS.—Red oxide, 5s. 8d. to 5s. 10d. per lb.; Corrosive sublimate, 3s. 9d. to 3s. 11d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 4s. 3d. to 4s. 5d. per lb.

METHYL SALICYLATE.—1s. 5d. to 1s. 7d. per lb.

METHYL SULPHONAL.—16s. 6d. per lb.

METOL.—9s. per lb. British make.

PARAFORMALDEHYDE.—1s. 11d. for 100% powder.

PARALDEHYDE.—1s. 1d. to 1s. 4d. per lb.

PHENACETIN.—4s. to 4s. 3d. per lb.

PHENAZONE.—6s. to 6s. 3d. per lb.

PHENOLPHTHALEIN.—4s. to 4s. 3d. per lb.

POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—80s. per cwt., less 2½% for ton lots.

POTASSIUM CITRATE.—1s. 11d. to 2s. 2d. per lb.

POTASSIUM FERRICYANIDE.—1s. 9d. per lb. in cwt. lots. Quiet.

POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity

POTASSIUM METABISULPHITE.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.

POTASSIUM PERMANGANATE.—B.P. crystals, 7½d. per lb., spot, slightly easier.

QUININE SULPHATE.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.

RESORCIN.—3s. 9d. per lb. In fair quantities.

SACCHARIN.—55s. per lb. Better demand.

SALOL.—3s. per lb.

SODIUM BENZOATE, B.P.—1s. 10d. to 2s. 2d. per lb.

SODIUM CITRATE, B.P.C., 1911.—1s. 8d. to 1s. 11d. per lb., B.P.C., 1923. 1s. 11d. to 2s. 2d. per lb., according to quantity.

SODIUM FERROCYANIDE.—4d. per lb. carriage paid.

SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.

SODIUM NITROPRUSSIDE.—16s. per lb.

SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—75s. to 80s. per cwt., according to quantity.

SODIUM SALICYLATE.—Powder, 1s. 9d. to 2s. 1d. per lb. Crystal, 1s. 10d. to 2s. 1d. per lb. Very heavy demand.

SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 2d. per lb.

SODIUM SULPHITE, ANHYDROUS, £27 10s. to £28 10s. per ton, according to quantity; 1-cwt. kegs included.

SULPHONAL.—11s. 6d. per lb. Limited demand.

TARTAR EMETIC, B.P.—Crystal or Powder, 1s. 10d. to 1s. 11d. per lb.

THYMOL.—12s. to 13s. 9d. per lb. Strong demand.

Perfumery Chemicals

ACETOPHENONE.—9s. per lb.

AUBEPINE (EX ANETHOL).—9s. 6d. per lb.

AMYL ACETATE.—3s. per lb.

AMYL BUTYRATE.—6s. 6d. per lb.

AMYL SALICYLATE.—3s. 3d. per lb.

ANETHOL (M.P. 21/22° C.).—6s. per lb.

BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—2s. 3d. per lb.

BENZYL ALCOHOL FREE FROM CHLORINE.—2s. 3d. per lb.

BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.

BENZYL BENZOATE.—2s. 9d. per lb.

CINNAMIC ALDEHYDE NATURAL.—17s. 6d. per lb.

COUMARIN.—11s. 9d. per lb.

CITRONELLOL.—15s. per lb.

CITRAL.—9s. per lb.

ETHYL CINNAMATE.—9s. per lb.

ETHYL PHTHALATE.—3s. per lb.

EUGENOL.—9s. 6d. per lb.

GERANIOL (PALMAROSA).—19s. 3d. per lb.

GERANIOL.—7s. to 16s. per lb.

HELIOTROPINE.—6s. per lb.

ISO EUGENOL.—14s. per lb.

LINALOL EX BOIS DE ROSE.—17s. 3d. per lb.

LINALYL ACETATE.—18s. per lb.

METHYL ANTHRANILATE.—9s. 3d. per lb.

METHYL BENZOATE.—5s. per lb.

MUSK KETONE.—35s. per lb.

MUSK XYLOL.—8s. 6d. per lb.

NEROLIN.—4s. per lb.

PHENYL ETHYL ACETATE.—12s. per lb.

PHENYL ETHYL ALCOHOL.—9s. 6d. per lb.

RHODINOL.—28s. 6d. per lb.

SAFROL.—1s. 8d. per lb.

TERPINEOL.—1s. 6d. per lb.

VANILLIN.—21s. 6d. to 23s. per lb. Good demand.

Essential Oils

ALMOND OIL.—12s. 6d. per lb.

ANISE OIL.—3s. 6d. per lb.

BERGAMOT OIL.—32s. 6d. per lb.

BOURBON GERANIUM OIL.—11s. 9d. per lb.

CAMPHOR OIL.—60s. per cwt

CINNAMON OIL, LEAF.—5d. per oz.

CASSIA OIL, 80/85%.—10s. per lb.

CITRONELLA OIL.—Java, 85/90%, 3s. 2d. Ceylon, 2s. 2d. per lb.

CLOVE OIL.—7s. per lb.

EUCALYPTUS OIL, 70/75%.—1s. 10d. per lb.

LAVENDER OIL.—French 38/40%, Esters, 22s. 6d. per lb.

LEMON OIL.—9s. per lb.

LEMONGRASS OIL.—4s. 9d. per lb.

ORANGE OIL, SWEET.—13s. per lb.

OTTO OF ROSE OIL.—Bulgarian, 65s. per oz. Anatolian, 35s. per oz.

PALMA ROSA OIL.—12s. 3d. per lb.

PEPPERMINT OIL.—Wayne County, 85s. per lb. Japanese, 13s. per lb.

PETITGRAIN OIL.—9s. per lb.

SANDAL WOOD OIL.—Mysore, 26s. per lb. Australian, 18s. 6d. per lb.

Recent Chemical Tenders

RECENT chemical tenders accepted include:—New purifiers, £805; oxide drying shed, £308, for Bollington U.D.C., R. Dempster. Extension to ammonia plant and supply of liquor storage tank, for Greenock Gas Committee, R. Dempster, £4,228 (recommended). Paints and enamels, for Battersea B.C., Jensen and Nicholson, Ltd., Stratford. Carbolic acid, Adcocks, Ltd., 2s. 3d. per gal.; carbolic powder, Dussek Brothers and Co., Ltd., £6 a ton, both for Lambeth B.C.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, April 1, 1926.

TRADE during the current week has been on the quiet side, doubtless owing to the approach of the holidays. There has been practically no alterations in prices, which continue very firm on the whole.

Export trade can only be described as moderate.

General Chemicals

ACETONE continues firm, at £82 to £83 per ton.

ACID ACETIC meets with a fair demand, at £37 to £39 per ton for 80% technical, and £38 to £40 per ton for pure.

ACID FORMIC is somewhat more active, the present value being about £50 per ton.

ACID LACTIC is more active and the price is unchanged, at £43 10s. per ton, ex wharf, for 50% by weight.

ACID OXALIC is in very small demand, but the price is firm at 3¾d. per lb.

ACID TARTARIC is unchanged in value, at 11½d. per lb., with only a very moderate inquiry.

ALUMINA SULPHATE is firm at £5 15s. per ton, the material being in fair request.

AMMONIUM CHLORIDE continues weak, at about £18 per ton.

ARSENIC.—The market is purely nominal, at £13 10s. to £14 per ton; export inquiry is entirely absent.

BARIUM CHLORIDE is quieter, but the price is maintained at £10 10s. per ton.

EPSOM SALTS are in fair request, but the price is unchanged at £5 15s. per ton.

FORMALDEHYDE is quietly steady, at £41 to £43 per ton.

IRON SULPHATE is unchanged.

LEAD ACETATE continues its firmer tendency; white is quoted at £44 10s. per ton, with brown at £43 10s. per ton.

METHYL ALCOHOL is a weak spot, at £45 per ton.

METHYL ACETONE is firm at £55 to £60 per ton, according to quality.

POTASSIUM CARBONATE AND CAUSTIC are unchanged.

POTASSIUM CHLORATE is not quite so active, but the price is well maintained at 4d. per lb. for spot deliveries.

POTASSIUM PERMANGANATE.—The demand is small, and is quoted at about 7d. per lb.

POTASSIUM PRUSSIATE has been in somewhat better demand and is firm at 7¼d. per lb.

SODIUM ACETATE continues scarce and the price is unchanged at £21 to £22 per ton.

SODIUM BICHROMATE is unchanged at British makers' figures.

SODIUM CHLORATE is firm and scarce, at 3d. to 3¼d. per lb.

SODIUM NITRITE is easier, at £21 per ton.

SODIUM PHOSPHATE is firm, and meets wtih a fair demand, at £13 10s. per ton.

SODIUM PRUSSIATE is fairly active and is firm at 4d. per lb.

SODIUM SULPHIDE is unchanged at British makers' figures.

Coal Tar Products

The market generally maintains a firm tone, with little change in prices to report from last week.

90's BENZOL is in good demand, and is quoted at 1s. 9½d. per gallon on rails, the motor quality being quoted at the same price.

PURE BENZOL is unchanged, and is quoted at 2s. 1d. to 2s. 2d. per gallon on rails.

CREOSOTE OIL is steady at 5¾d. to 6d. per gallon on rails in the North, while the price in London is from 6¾d. to 7d. per gallon on rails.

CRESYLIC ACID is quoted at from 1s. 10d. to 2s. per gallon on rails for the pale quality 97/99%, for export to America, while the dark quality, 95/97%, is quoted at 1s. 8d. to 1s. 9d. per gallon on rails. The home trade prices remain unchanged, at 1s. 6d. per gallon on rails for the pale quality, and 1s. 4d. per gallon on rails for the dark quality.

SOLVENT NAPHTHA remains steady at 1s. 5d. per gallon on rails.

HEAVY NAPHTHA is quoted at 1s. to 1s. 1d. per gallon on rails.

NAPHTHALENES are unchanged, the lower grades being worth from £3 10s. to £4 5s. per ton, 76/78 quality about £6 per ton, and 74/76 quality about £5 to £5 10s. per ton.

PITCH remains firm and prices are well maintained. To-day's value is 85s. to 90s. per ton f.o.b. U.K. port.

Latest Oil Prices

LONDON.—LINSEED OIL tends easier; spot, £31 5s., ex mill; March and April, £29 15s.; May-August, £29 17s. 6d.; September-December, £30 5s. RAPE OIL firm; crude, crushed, spot, £49, nominal; technical refined, £50 COTTON OIL quiet; refined; common edible, £42; Egyptian, crude, £36; deodorised, £44. TURPENTINE quiet and 3d. to 6d. per cwt. lower; American, spot and April, 65s.; May-June, 64s. 6d.; and July-December, 60s. 6d.

HULL.—LINSEED OIL.—Naked, spot to May-August, £30 2s. 6d.; September-December, £30 5s. COTTON OIL.—Naked Bombay crude, £35; Egyptian crude, £36; edible refined, £39 10s.; technical, £38 15s. PALM KERNEL OIL.—Crushed naked, 5½ per cent., £42 10s.—GROUNDNUT OIL, Crushed-extracted, £43 10s.; deodorised, £47 10s. SOYA OIL.—Extracted and crushed, £37; deodorised, £40 10s. RAPE OIL.—Crude extracted, £47 10s.; refined, £49 10s. per ton, net cash terms. CASTOR OIL.—Pharmaceutical, 50s. 9d.; first, 45s. 9d.; second, 42s. 9d. COD OIL.—Spot, 27s. 6d. per cwt., barrels, ex mill.

Nitrogen Products Market

Export.—During the last week the demand for sulphate of ammonia has continued steadily both from the continent and the Far East. As consumption of stocks in these countries is proceeding rapidly the market has remained firm. British producers still quote on the basis of £12 10s. per ton, f.o.b. in single bags. It is expected that the price will remain steady until early May.

Home.—Home merchants report continued activity in almost all parts of the country. Producers in agricultural districts have been inundated with orders and sulphate of ammonia has had to be railed from industrial centres. There seems every indication that the home season will exceed that of last year by 10 per cent. or more. Home prices remain unchanged and will almost certainly be unchanged until end of May.

Nitrate of Soda.—The nitrate market remains firm. Cargoes c.i.f. chief European ports are changing hands on the basis of £11 11s. to £11 14s. per ton. It is not expected that there will be any changes of a violent nature in the nitrate market until the season has closed.

Salt Union Waste Heat Judgment

ON Wednesday, in the Chancery Division, Mr. Justice Tomlin delivered his reserved judgment in the action in which the Salt Union, Ltd., of Colonial House, Liverpool, sought a declaration that they were entitled to all the waste heat from Dorman Long and Co.'s blast furnaces at Port Clarence, Middlesbrough, for evaporation purposes at their brine pans, which are adjoining.

The action arose on an agreement of July, 1900, between the plaintiffs and the defendants' predecessors, Bell Brothers, Ltd., the plaintiffs claiming that the term "waste heat" in that agreement included the live gas from the furnaces. The defendants said it meant only the heat from the boilers.

His Lordship said he could not find that, speaking generally, there had been any substantial diminution in the heat to the salt pans. It was true that there seemed to have been a fall in salt production, but, having regard to the many factors bearing on this and the inadequate information he had, he could draw no certain inference as to the cause. He found, however, that Bell Brothers had always tried to work their boilers most efficiently, and had not sought to limit the gas burnt in the boiler, except to obtain the best results. The plaintiffs said that the term "waste heat" included the potential heat of the live gas as well as the sensible heat going to waste as the result of the combustion of the live gas. The evidence, in his opinion, established nothing of the kind, and he held that the agreement referred only to waste heat reaching the salt pans from a particular source, viz., the sensible heat of the exit gases of the boilers. The plaintiffs' claim failed and must be dismissed, with costs.

Potash Bill in U.S.A.

POTASH DEPOSITS or occurrence in the United States as well as improved methods of recovering potash therefrom, is the subject of a bill favourably reported by the agricultural committee of the U.S. Senate. This bill authorises an investigation by the Geological Survey and the Bureau of Soils of the Department of Agriculture, and provides for an appropriation of $550,000 for the fiscal year ending June 30, 1926, and a similar amount for the succeeding four years. The bill now goes to the Senate calendar for action.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

BUSINESS during the past week has, if anything, been a little brighter, although quantities called for leave much to be desired. There are no changes in prices of any importance to record.

Industrial Chemicals

ACID ACETIC, 98-100%, quoted £55 to £67 per ton, according to quantity and packing, c.i.f. U.K. port; 80% pure, £40 to £41 per ton; 80% technical, £38 to £39 per ton, packed in casks, c.i.f. U.K. ports.

ACID BORIC.—Crystal, granulated, or small flakes, £37 per ton; powdered, £39 per ton, packed in bags, carriage paid U.K. stations.

ACID CARBOLIC, ICE CRYSTALS.—Now quoted 5d. per lb., delivered or f.o.b. U.K. ports; but even this lower price could probably be shaded for large quantities.

ACID CITRIC, B.P. CRYSTALS.—Unchanged at about 1s. 3¼d. per lb., less 5% ex wharf.

ACID FORMIC, 85%.—Spot material quoted about £49 15s. per ton, ex store. Offered from the Continent at about £49 per ton, ex wharf; prompt shipment.

ACID HYDROCHLORIC.—In little demand; price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—Remains unchanged at £23 5s. per ton, ex station; full truck loads.

ACID OXALIC, 98-100%.—Offered from the continent at 3⅝d. per lb, c.i.f. U.K. ports. Spot material quoted 3¾d. per lb., ex store.

ACID SULPHURIC, 144°.—£3 12s. 6d. per ton; 168°, £7 per ton, ex works; full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Quoted 11¼d. per lb., less 5% ex wharf, early delivery.

ALUMINA SULPHATE, 17-18%, IRON FREE.—Quoted £5 10s. per ton, c.i.f. U.K. ports, early delivery. Spot material available at about £6 5s. per ton, ex store.

ALUM, LUMP, POTASH.—Unchanged at about £7 12s. 6d. per ton, c.i.f. U.K. ports. Spot material quoted £9 per ton, ex store. Powdered quality 5s. per ton less. Powdered quality offered from the Continent at about £7 7s. 6d. per ton, c.i.f. U.K. ports.

AMMONIA ANHYDROUS.—Imported material quoted 1s. per ton, ex wharf. Containers extra, and returnable. This price can be shaded for large quantities.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks, delivered or f.o.b. U.K. ports. Industrial quality about £10 per ton less.

AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £25 to £26 per ton, ex station. On offer from the continent at about £22 per ton, c.i.f. U.K. ports. Fine white crystals offered from the Continent at about £18 12s. 6d. per ton, c.i.f. U.K. ports.

ARSENIC.—Market remains steady, spot material quoted £17 per ton, ex store. Offered for early delivery at about £16 15s. per ton, ex wharf.

BARIUM CHLORIDE, 98-100%.—Quoted £9 per ton, c.i.f. U.K. ports, prompt shipment from the Continent. Spot material scarce, but some available at about £10 15s. per ton, ex store.

BLEACHING POWDER.—English material quoted £9 10s. per ton, ex station. Contracts 20s. per ton less. On offer from the Continent at about £7 10s. per ton, c.i.f. U.K. ports.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. ports.

BORAX.—Granulated £22 10s. per ton; crystals, £23 per ton; powdered, £24 per ton; carriage paid U.K. stations.

CALCIUM CHLORIDE.—English manufacturers' price unchanged at £5 12s. 6d. to £5 17s. 6d per ton, carriage paid U.K. stations. Continental cheaper, now quoted £4 10s. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Quoted £3 17s. 6d. per ton, f.o.b. U.K. ports for export. About £3 10s. per ton, f.o.r. works for home consumption.

COPPER SULPHATE, 99-100%.—Price for British material £23 10s. per ton, f.o.b. U.K. ports. Moderate inquiry for export. Continental on offer at about £22 per ton, ex wharf.

FORMALDEHYDE, 40%.—Quoted £37 per ton, c.i.f. U.K. ports. Prompt shipment. Spot material available at about £38 per ton, ex store.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental on offer at about £3 per ton, c.i.f. U.K. ports.

LEAD, RED.—Imported material now on offer on spot at £38 15s. per ton, ex store.

LEAD, WHITE.—Quoted £38 per ton, c.i.f. U.K. ports, early delivery. Spot material available at about £39 15s. per ton, ex store.

LEAD ACETATE.—White crystals on offer from the Continent at about £42 10s. per ton, c.i.f. U.K. ports. Brown quoted about £38 5s. per ton, c.i.f. U.K. ports. Spot material available at about £44 per ton, ex store for white quality.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex station, in moderate demand.

POTASH CAUSTIC 88/92%.—Syndicate prices vary from £25 10s. to £28 15s. per ton, c.i.f. U.K. ports, according to quantity and destination. Spot material available at about £29 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 4½d. per lb., delivered.

POTASSIUM CARBONATE 96/98%.—Spot material quoted £26 10s. per ton, ex store. Quoted £25 per ton, ex wharf, to come forward. 90/94% quality on offer at £22 10s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE. 98/100% CRYSTALS.—Higher quotations from the Continent, now quoted £33 12s. 6d. per ton, c.i.f. U.K. ports. Powdered on offer at about £32 per ton, c.i.f. U.K. ports.

POTASSIUM NITRATE, SALTPETRE.—Quoted £22 5s. per ton, c.i.f. U.K. port, prompt shipment. Spot material available at about £25 per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Spot material quoted 8d. per lb., ex store. Offered for early delivery at 7½d. per lb., ex wharf.

POTASSIUM PRUSSIATE, YELLOW.—In moderate demand. Spot material quoted 7½d. per lb., ex store, but could probably be obtained for less. On offer for prompt shipment from the Continent at 7d. per lb., c.i.f. U.K. port.

SODA CAUSTIC.—76/77%, £17 10s. per ton; 70/72%, £16 2s. 6d. per ton; broken 60%, £16 12s. 6d. per ton; powdered, 98/99%, £20 17s. 6d. per ton. All carriage paid U.K. stations, spot delivery. Contracts, 20s. per ton less.

SODIUM ACETATE.—Spot material now available at about £21 per ton, ex store. Offered for prompt shipment at about £20 5s. per ton, c.i.f. U.K. ports.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station, M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—English price unchanged at 3½d. per lb., delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station; powdered or pea quality, £1 7s. 6d. per ton more; alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 per ton, ex station; minimum 4-ton lots. Pea crystals, £14 5s. per ton, ex station. Continental commercial quality offered £9 per ton, ex store.

SODIUM NITRATE.—Quoted £13 per ton, ex store; 96/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE 100%.—Quoted £24 per ton, ex store, offered from the Continent at about £22 5s. per ton, c.i.f. U.K. ports.

SODIUM PRUSSIATE, YELLOW.—In moderate demand, spot material now available at 4¼d. per lb., ex store. Offered for early delivery at 4d. per lb., ex wharf.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton, ex works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—60/62% solid, £13 5s. per ton; broken, £14 5s. per ton; flake, £15 5s. per ton; crystals 31/34%, £8 12s. 6d. per ton: all delivered buyers' works U.K., minimum 5-ton lots, with slight reduction for contracts. 60/62% solid quality offered from the Continent at about £9 15s. per ton, c.i.f. U.K. ports; broken, 15s. per ton more; crystals, 30/32%, £7 per ton, c.i.f. U.K. ports.

SULPHUR.—Flowers, £11 5s. per ton; Roll, £10 per ton; Rock, £10 per ton; Ground, £9 15s. per ton—ex store, spot delivery. Prices nominal.

ZINC CHLORIDE.—British material 96/98% quoted £23 15s. per ton, f.o.b. U.K. port; 98/100% solid on offer from the Continent at about £21 15s. per ton, c.i.f. U.K. ports; powdered, 20s. per ton extra.

ZINC SULPHATE.—Continental manufacture on offer at about £11 per ton, ex wharf.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

BETA NAPHTHOL.—11d. per lb. Some home inquiries.

BENZALDEHYDE.—2s. 2d. per lb. Some home inquiries.

NAPHTHIONATE OF SODA.—1s. 8d. per lb. Some home inquiries.

ALPHA NAPHTHOL.—2s. per lb. Small home inquiries.

PARANITRANILINE.—1s. 9d. per lb. Small home inquiries.

Manchester Chemical Market

(From Our Own Correspondent.)

Manchester, April 1, 1926.

The approaching Easter break has had a further quietening influence on an already inactive market and business in chemicals here since last week has been confined within a small compass, the demand being slow for most of the products. Home users are still conducting their buyings operations on a scale which points pretty definitely to hand-to-mouth transactions and little more, while for export actual business has been quiet although a fair number of inquiries are being received.

Heavy Chemicals

There is not much movement in phosphate of soda but quotations are steady at £12 10s. to £12 15s. per ton. Acetate of soda is not selling in big quantities although values maintain their firmness, £21 to £21 10s. per ton still being asked. Bleaching powder continues to be quoted at about £8 10s. per ton; demand for this is moderate at the moment. A fair inquiry for hyposulphite of soda has been met with and values are keeping up, photographic material being quoted at £14 5s. to £14 10s. per ton and commercial at about £9 10s. Caustic soda is maintained at £15 2s. 6d. per ton for 60 per cent. quality and £17 10s. for 76 per cent., and the current demand for this for home use and for shipment is of a quietly steady character. Saltcake continues to be quoted at round £3 per ton, but the demand for this is still subdued. Glauber salts are also a slow selling section at round £3 5s. per ton. Sulphide of sodium is in quiet demand and prices show an easy tendency, with 60-65 per cent. concentrated solid quoted at £11 to £11 5s. per ton and crystals at round £9 12s. 6d. Bichromate of soda is unchanged in position or value at 3¼d. per lb. Bicarbonate of soda is steady at £10 10s. per ton, but the demand is slow. Alkali is firm and in moderate request at £6 15s. per ton. For chlorate of soda inquiry has been fairly good and prices are steady at 3½d. to 3¾d. per lb.

Caustic potash finds a moderate market at fairly steady prices, 90 per cent. material being quoted at round £27 5s. per ton. Carbonate of potash is in quietly steady demand at about £26 per ton for 96 per cent. quality. Inquiry for permanganate of potash is still rather slow and values are easy, although not quotably changed; commercial material is on offer at 5d. to 5¼d. per lb. and B.P. at about 7d. per lb. Chlorate of potash is steady at 4d. per lb. and some demand for this has been met with. Yellow prussiate of potash is not selling in important quantities and prices are rather less steady at round 7d. per lb. Bichromate of potash is in limited inquiry at 4¼d. per lb.

The demand for arsenic continues slow, but values are held at about £14 per ton on rails for white powdered, Cornish makes. Sulphate of copper is in moderate request, with quotations steady at about £24 5s. per ton. Commercial Epsom salts are slow but unchanged on the week at £3 12s. 6d. to £3 15s. per ton, with magnesium sulphate, B.P. quality, still offering at round £4 7s. 6d. Nitrate of lead is in quiet demand at £40 10s. per ton. Acetate of lead is well held at £44 per ton for white and about £40 for brown, although the demand for these during the week has only been moderate. Acetate of lime is still weak at £16 5s. to £16 10s. per ton for grey and £7 15s. for brown quality.

Acids and Tar Products

Acetic acid is steady and in quiet demand at £37 to £38 per ton for 80 per cent. commercial and about £67 for glacial. Citric acid is slow but little changed at about 1s. 3¼d. per lb. Tartaric acid keeps quiet at round 11¼d. per lb. Oxalic acid is steadier again and meets with a fair inquiry at 3½d. to 3⅝d. per lb.

The demand for pitch is less pressing, although prices show a firm tendency at about 80s. per ton, f.a.s. Manchester. Carbolic acid is dull and on the easy side at 5d. per lb. for crystals and 1s. 4½d. per gallon for crude. Solvent naphtha is quiet at round 1s. 6½d. per gallon. Creosote oil is in fair request and prices are steady at 6d. to 6¼d. per gallon.

Package of Chlorinated Lime

Deterioration during Storage

Department Bulletin No. 1,389 of the U.S. Department of Agriculture has just been issued, and it deals with the investigation by members of the Bureau of Chemistry into the deterioration of commercially packed chlorinated lime.

The available chlorine in most samples of bleaching powder packed in normal containers, it was found decreased fairly regularly during storage. Most of the available chlorine lost was transformed into chloride chlorine, the loss in total chlorine in most cases and the change in chlorate chlorine being very slight. There was no marked difference in deterioration in winter and summer packed goods. There was, however, a seasonal variation, the loss of available chlorine being greater in warm weather. In general, the keeping qualities of the bleaching powder were not greatly affected by the type and size of commercial container. There appeared to be a small difference in favour of the larger metal containers over the other commercial packages. The material stored in tightly stoppered glass bottles deteriorated slightly less than that stored in cans. Two of the samples of bleaching powder packed in the summer showed about the same rate of deterioration as the others for the first nine months. After that the rate of deterioration increased rapidly and was accompanied by a decided increase in the moisture content. This may indicate that the absorption of water catalyzes the change.

Effect of Light

The results on the rate of deterioration as affected by the method of packing did not lead to any definite conclusions. The hand-packed material put up in the summer showed a high rate of loss after about 10 months. As one of the machine-packed samples also showed a high rate of loss during the same time, however, this could not definitely be attributed to the method of packing. The visible rays of light seem to have a slight accelerating effect on the loss of available chlorine.

The average loss in available chlorine for all samples from the different sources, packed and stored in various ways, was 1·08 per cent. per month for the period covered.

U.S. Chemicals in 1925

Increase in Exports

The official figures of the U.S. Department of Commerce for 1925 show that the exports of chemical and allied products were valued at $158,500,000, a gain of 15 per cent. over the previous year, and 29 per cent. over 1922. All groups, with the exceptions of crude drugs and botanicals, essential oils, and dye extracts, showed expansions in 1925 as compared with 1924.

Methanol Values Halved

Industrial chemicals representing one-sixth of the total exports in 1925 showed little change during the last few months, but compared with 1924 recorded an 8 per cent. increase, having risen from $24,200,000 in 1924 to $25,900,000 in 1925. The exports of acids and anhydrides advanced in value from $959,400 to $973,000, but declined in quantity from 23,474,000 lb. to 23,115,000 lb. The value of the foreign sales of methanol was halved, although the quantity was only one-third less than the previous year's shipments, or a total for 1925 of 408,000 gals., valued at $321,300.

Larger shipments of the following chemicals were made in 1925 than in 1924:—aluminium sulphate, bleaching powder, copper sulphate, and potassium compounds other than chromate (3,848,500 lb., $363,000). Figures were reduced for acetate of lime, calcium carbide, formaldehyde, and potassium bichromate. Although the quantity of ammonia and ammonium compounds shipped in 1925 was greater than in 1924, the value was less, or a total in 1925 of 4,521,000 lb., valued at $871,000. Glycerine, on the other hand, showed larger value and smaller quantity, totals having amounted to 1,367,200 lb., $282,000.

Company News

TARMAC, LTD.—The annual meeting has been postponed until April 15.

DIAMOND MATCH CO. — The net profits for 1925 were 1,606,198 dol. and 4,395,060 dol. was brought forward.

ANGLO-PERSIAN OIL CO., LTD.—The directors have declared an interim dividend of 5 per cent., less income tax, on the ordinary shares, payable on April 15 next.

RIO TINTO CO., LTD.—The fifty-third ordinary general meeting of the shareholders will be held at the offices of the company, London, on April 7 at 12.30 p.m.

GRAPHITE OILS, LTD. — The report for the year ended December 31 last states that the net profits are £4,569. It is proposed to write £485 off profits, and £2,000 off preliminary expenses, to add £1,183 to the reserve, and to carry forward the remaining £900.

BLEACHERS' ASSOCIATION, LTD.—The shareholders of the Association at an extraordinary general meeting at Manchester on March 25, sanctioned the capitalisation of £1,422,651 of undivided profits and the distribution among the holders of ordinary shares in the proportion of three for every five held on March 25.

RECKITT AND SONS, LTD.—The directors have declared a final dividend of 1s. 9d. per ordinary share, making 4s. for the year, the same as for the previous year. The accounts show that the trading profit amounted to £1,272,000. A sum of £80,000 has been allocated by the directors for distribution among their employees as a prosperity bonus.

BELL'S UNITED ASBESTOS CO., LTD.—The report for the year ended December 31 last shows a net profit of £50,409, to which has to be added the amount brought forward, £34,844, making a total of £85,253. After allowing for the dividend on the preference shares, the directors recommend the payment on April 26 of a dividend on the ordinary shares of 2s. per share, which, with the interim dividend paid in October last, makes a total distribution at the rate of 12½ per cent. for the year; placing £2,000 to staff pensions fund, £8,000 to reserve, and carrying forward £34,962. The report adds that while in one or two departments of the company's business there was a decline in turnover and profit in 1925, which it is hoped is only temporary, this was offset by improvements in other directions, resulting in a net increase of £4,095 in the amount of net profit for the year. The directors feel that the time has arrived when some provision should be made for members of the company's staff, who, after long periods of faithful service, may find it necessary to retire. It is, therefore, proposed, as shown above, to set aside from the profits of the past year the sum of £2,000 as the nucleus of a staff pensions fund, and the directors hope that this will meet with the approval of shareholders.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

FERRO MANGANESE.—A firm in Stockholm desires to obtain the agency of a British manufacturer of ferro-manganese. (Reference No. 410.)

PETROLEUM PRODUCTS.—A firm in Turin desires to represent manufacturers of petroleum products, especially mineral oils, paraffin and naphtha. Correspondence in Italian or French. (Reference No. 402.)

HEAVY CHEMICALS.—A firm in El Paso, Texas, wishes to get in touch with British manufacturers of heavy chemicals who desire to export to Mexico. (Reference No. 415.)

NITRIC ACID.—The Anatolian Railway Administration are calling for tenders for the supply of 500 kilos of commercial nitric acid to be received in Constantinople up to noon on April 28. A copy of the specification and general condition of tender (in French) are available for inspection. (Reference B.X. 2449.)

FUEL OIL.—The State Electricity Supply Works at Montevideo invite tenders for the supply of fuel oil. (Reference B.X. 2434.)

NON-FERROUS METALS.—The Anatolian Railway administration invite tenders for the supply of zinc, lead, antimony, etc. (Reference A.X. 2964.)

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following trade marks can be lodged up to April 24, 1926.

"MELANOID"

465,858. Paints, varnishes, lacquers and enamels (in the nature of paints). Class I. The Mond Tar By-Products Syndicate, Ltd., 47, Victoria Street, London, S.W.1; merchants. January 5, 1926.

"MULTIFOR."

467,170. For dyestuffs. Class I. British Dyestuffs Corporation, Ltd., 70, Spring Gardens, Manchester; manufacturers of dyestuffs and chemicals. February 15, 1926. (To be associated. Sect. 24.)

Tariff Changes

BELGIAN CONGO.—Revised duties, effective as from December 30 last, include salt, in 100 kilog. bags, 4 fr., in tins, 8 fr., in cakes, 16 fr.; soaps, 20 per cent. *ad val.* (common 15 per cent. *ad val.*).

CHINA.—Surtaxes on foreign imports are proposed. Articles are divided into 7 classes with varying rates applicable. Class E, 7½ per cent. surtax includes dyes, colours, bleaching powder, paints, pigments, varnish and paint material, zinc dust, inks, tanning materials: Wax, stearine, fats, essential and volatile oils, etc. Soap, naphtha, etc., and celluloid.

U.S.A.—The Tariff Commission on casein has reported, and it is understood that no change in the rate will be made.

Industry in the Colonies

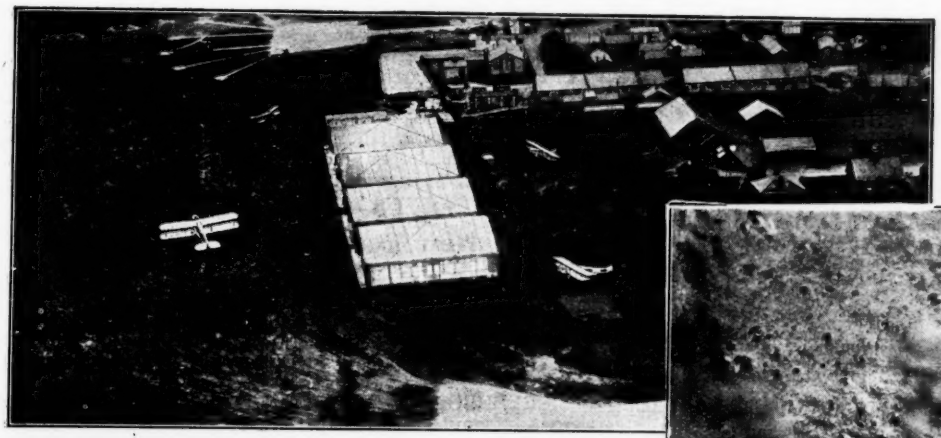
Prospects Generally Good

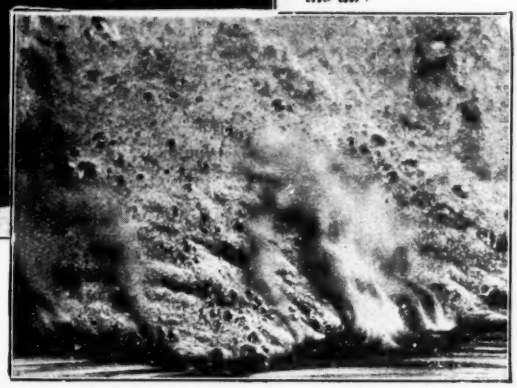
GENERAL trade conditions in the Colonies are of considerable importance to the exporter, and in general it may be said that industry in the Colonies is at present certainly promising, and offers possibilities to the enterprising trader.

Reports from Canada state that wholesale buying, particularly in oils, varnishes, paints, and rubber products, is rapidly expanding, and there is a general atmosphere of confidence in the market. The Nova Scotian Government is to carry out a thorough investigation of its coal mining industry, and has agreed to a temporary rebate of 20 per cent. of the royalties on coal mines by the British Empire Steel Corporation.

Prospects in Australasia are distinctly good, and much American money is reported to be finding its way into the markets. At Melbourne alone £200,000 is mentioned for one week. Orders are increasing steadily. From South Africa reports mention a very considerable demand for plant for the platinum fields, but the production is being delayed by transport difficulties. Engineering output is increasing, and there is a boom in building operations. Farming is flourishing, and there are important demands for agricultural plant. There should be a rapidly expanding market for fertilisers and allied products.

In Brazil the port of Nictheroy is to be extended and improved to open up a direct channel for trading purposes. The German porcelain industry is depressed, and works are limiting production, but the potash industry, the brewing industry, and textile production are improving. The Czechoslovakian glass industry is out to modernise its plant in order to produce cut glass which will compete with Belgian products. There should be openings for plant and relative chemicals in this country. A serious shortage of half-white window glass is reported in the Soviet Republic, and until the local glass works are modernised and mechanical labour introduced, there is a market for supplies.





Firefoam from Foamite equipment literally smothers the fiercest flames in an instant—by blanketing the burning surface, liquid or solid, and shutting off the air.

Air Ministry *places large order with Foamite Firefoam Ltd.*

A CRASH fire is ghastly to contemplate, and certainly one of the most difficult to deal with. Numerous fire extinguishing methods have been investigated by the Air Ministry, and it is therefore all the more significant that an order for 2,000 extinguishers has been received by Foamite Firefoam Limited from this Government Department.

How Firefoam smothers any fire

FOAMITE Firefoam controls and extinguishes fire by the quickest and surest way known to modern science. Immediately a burning surface is covered with Firefoam, the oxygen of the air is excluded and combustion ceases.

Every Foamite appliance employs two harmless chemical solutions which are automatically mixed when it is operated. Their combination produces millions of tough, heat-resisting bubbles—Firefoam. The eight-fold expansion of the solutions into Firefoam generates the pressure which is responsible for the strong, steady jet obtained.

Firefoam resists the most intense heat, and the draught of the fiercest fire cannot prevent it from reaching the burning surface. It adheres to solids—even to walls and ceilings.

There is no soaking through or dripping as is the case when water or ordinary chemical extinguishers are used. Genuine Foamite protection is effective upon all kinds of fires, ordinary as well as extra-hazardous. After the fire is out Firefoam may be brushed or washed away. If left, it will break down to a powder which can be removed without the slightest difficulty.

No noxious gases and no damage to material are special features of Foamite fire protection.

Foamite Engineers will assist you

THE practical experience of Foamite Engineers covers the whole field of scientific fire control. Behind them is the Company with a vast knowledge of all the problems appertaining to fire protection and the manufacture of fire-fighting devices.

That experience which enabled Foamite Engineers to design suitable systems for the protection of the boiler-rooms of the largest liners afloat—the "Majestic," the "Mauretania," the "Aquitania," etc.—and for the safeguarding of huge tank farms, is at your disposal, without obligation.

Foamite representatives are to be found in all large towns throughout the world, and they can prescribe exactly the right protection in the right place. They will study your problem, and should you instal Foamite apparatus, will keep it in working order.

There is no need to run big risks to-day. Heavy loss through not knowing just what to instal can be avoided. Suitable apparatus is available for every class of risk.

Send for a copy of the fully illustrated booklet entitled "Extinguishing Oil and Other Fires." It describes at some length the Foamite road to real security from uncontrolled fires

FOAMITE FIREFOAM LTD., 24-26 MADDOX STREET, LONDON, W.1

Foamite Fire Protection

Please send free copy of "Extinguishing Oi and Other Fires."

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Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

MILTON PROPRIETARY, LTD., London, E.C., chemical manufacturers. (M., 3/4/26.) Registered March 17, £10,000 and £500 debentures, part of £30,000; charged on 124 and 125, Bunhill Row, E.C., and part of 2, Pembroke Street, Islington, etc., also general charge. *Nil. December 31, 1924.

SPINNINGFIELD CHEMICAL CO., LTD., Manchester. (M., 3/4/26.) Registered March 20, £3,300 debentures; general charge. *£3,300. August 20, 1924.

Satisfaction

BRITISH TAR PRODUCTS, LTD., London, S.W. (M.S., 3/4/26.) Satisfaction registered March 19, £45,030, registered May 11, 1921.

Receiverships

BEDFORD CHEMICAL CO. (1922), LTD. (R., 3/4/26.) E. Lucas, C.A., of 7, St. Paul's Square, Bedford, was appointed Receiver on March 18, 1926, under powers contained in debenture dated October 23, 1923.

NEUTRON, LTD. (R., 3/4/26.) W. S. Dawson, C.A., of 31, Great James Street, Bedford Row, W.C., was appointed Receiver and Manager, on March 17, 1926, under powers contained in debenture dated September 29, 1924.

NICHOLS CHEMICAL CO., LTD. (R., 3/4/26.) J. L. Heppard, of 19, Richmond Terrace, Blackburn, was appointed Receiver and Manager on March 20, 1926, under powers contained in debenture dated September 23, 1925.

London Gazette, &c.

Company Winding Up Voluntarily

PATERSON AND CO. (DYERS AND FINISHERS), LTD. (C.W.U.V., 3/4/26.) G. Saville Smith, Chartered Accountant, 17, Piccadilly, Bradford, appointed liquidator, March 17.

Notices of Dividends

SWITHENBANK, Harold, 132, Beeches Road, West Bromwich, analytical chemist. Eighth dividend, 1s. per £, payable April 9, Official Receiver's Office, 191, Corporation Street, Birmingham.

WOODS, Frederick, formerly 38a, Shepherd Street, Preston, a soap manufacturer. First and final dividend, 1s. 11d. per £, payable March 31, Official Receiver's Offices, 11, Winckley Square, Preston.

Deed of Arrangement

INMAN, Frank Sutcliffe, 5, Burlington Chambers, and 44, Manville Road, Keighley, wholesale druggist. (D.A., 3/4/26.) Filed March 23. Trustee, C. H. Baker, Standard Buildings, City Square, Leeds, accountant. Secured creditors, £21; liabilities unsecured, £465; assets, less secured claims, £98.

Business Names Registered

[*The following (trading name and address, nature of business, date of commencement, and proprietors' names and addresses) have been registered under the Registration of Business Names Act.*]

ALFRED SCOTT, oil extracting and fertiliser manufacturing, Maxwell Street, Hull. Mr. Ernest Scott, 137, Westbourne Avenue, Hull. January 21, 1926.

BENTHAM CHEMICAL CO., chemical manufacturers, Wenning Avenue, Bentham, Yorkshire. Mr. Percy Marland, Kempfield House, Knottingley, Yorkshire. March 1.

PREMIER DISINFECTING CO., makers and sellers of all classes of disinfectants and cleansing fluids, 38, Boleyn Road, Dalston, N.16. Messrs. Ernest A. Barlow and Reginald P. Dudeney. March 18.

TOWER MANUFACTURING AND CHEMICAL CO., disinfectant fluid, soft soap manufacturers and oil blenders, Providence Works, Hilton Lane, Little Hulton, near Bolton. Messrs. Sarah Morgan and Nellie Catterall, both of Bolton. February 8.

New Companies Registered

BRITISH TITANIUM CO., LTD., London House, 3, New London Street, London, E.C.3. Registered March 27, 1926. Manufacturers of and dealers in titanium, thorium, zirconium, and kindred metals, copper, zinc, spelter and antimony smelters and refiners, etc. Nominal capital, £1,000 in £1 shares.

CELLULOSE FIBRE CO., LTD. Registered March 27, 1926. Manufacturers, exporters or importers of or dealers in cellulosic and other fibrous materials, etc. Nominal capital, £2,000 in £1 shares. A director: R. Marx, 35, Finsbury Square, London, E.C.2.

KINDER, LTD. Registered March 27, 1926. Oil, fat, grease, and glycerine importers, exporters, merchants, boilers, melters, refiners, manufacturers, etc. Nominal capital, £1,500 in £1 shares (1,000 7 per cent. cumulative preference and 500 ordinary). Secretary: C. A. Smith, 6, Bodney Road, Hackney, London, E.8.

Forthcoming Trade Fairs

THE following is an official list of the most important trade fairs, together with details of British representation or official offices :—

The Chemists' Exhibition.—Holland Park Hall, London, W., May 10-14. The British and Colonial Druggist, Ltd., 194-200, Bishopsgate, London, E.C.2.

Chemists' Exhibition in Glasgow.—St. Andrew's Hall, September 20-24. Organised by The British and Colonial Druggist, Ltd., 194-200, Bishopsgate, London, E.C.2.

Osaka Electrical Exhibition.—March 20 to May 31. Exhibition, c/o Denki Kyokwai Kwansai Shibu, Dojima-Naka, 2, Chome, Kita-ku, Osaka.

Lille Commercial Fair.—April 2-18.

Brussels International Official Commercial Fair.—April 7-21. 19, Grand Place, Brussels.

Frankfort Spring Fair.—April 11-14.

Milan International Sample Fair.—April 12-17. 8, Via Amedei, Milan (6).

Paris Fair.—May 8-24. Administration of the Fair, 8, Place de la Bourse, Paris.

Padua International Sample Fair.—June 5-20. "Ente Autonomo Fiera Camponiaria Internationale," Padova.

Leipzig Autumn Fair.—August 29-September 4. Technical Fair—August 29-September 8. 1, Gower Street, London, W.C.1.

Slump in French Radium

ACCORDING to Paris advices to the American Chemical Society, the French radium industry is facing a crisis. The discovery of Belgian sources brought the price down by nearly 50 per cent. An ore value of 800 francs gives radium equivalent to 1,400 francs, which does not allow much, since about 490 tons of ore, 800 tons of water, 100 tons of coal, and 190 tons of chemicals are required to get one gram of radium. The Belgian Hoboken Society, which actually treats the Katanga ore, has produced in the last three years a quantity of radium rated at 50 grams. This stock permits suppressing the radium industry in France, which produces limited quantities, in accordance with national needs. The two French manufacturers, Armet de l'Ile at Nogent, and Henri de Rothschild at St. Denis, are treating betafites and Madagascar ores, which are more difficult to treat than those of the Belgian Congo. These two factories are continuing manufacture in spite of numerous difficulties, and are trying to develop in France the industry of luminous painting.